Chemical Industries

JULY 1950

ETHYLENE OXIDE ANNUAL OUTPUT NEARS 640 MILLION LBS. . . . . p. 41

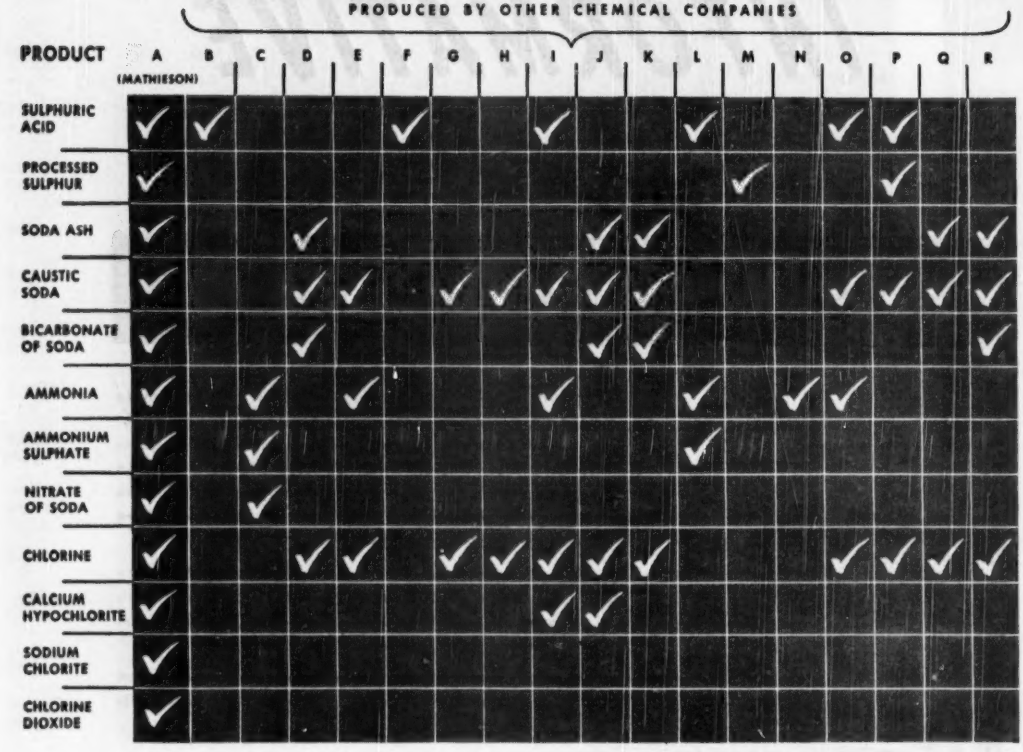
Cover: Ethylene oxide fractionating towers


When You Specify
SOLVAY Products
for Glass . . .
. . . you get the ultimate in quality—the kind of quality you would expect from America's leading producer of alkalies. But in addition, you get the fast, dependable delivery service which can only come from a company having more than one plant . . . and over 200 local stock points from coast to coast. You also get Solvay's exclusive Technical Service . . . men specially trained in the glass industry.
SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
SOLVAY
PRODUCTS
for the
Glass Industry
SODA ASH
POTASSIUM CARBONATE
Calcined and Hydrated
AMMONIUM BICARBONATE
SODIUM NITRITE
Soda Ash • Caustic Soda • Caustic Potash • Chlorine • Potassium Carbonate • Calcium Chloride • Sodium Bicarbonate • Specialty Cleansers • Sodium Nitrite
Nytron • Ammonium Bicarbonate • Para-dichlorobenzene • Ortho-dichlorobenzene • Monochlorobenzene • Methanol • Ammonium Chloride • Formaldehyde

12 BASIC CHEMICALS

ALL *produced by*

MATHIESON



This inclusive selection of basic chemicals—all available from one reliable source of supply—enable Mathieson customers to simplify their purchasing procedures. They benefit further by obtaining chemicals of outstanding purity.

These are but two of the many specific reasons it will pay you to check with Mathieson before ordering any heavy chemical. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Mathieson CHEMICALS

8338

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Chemical Industries

Including CHEMICAL SPECIALTIES

Vol. 67, No. 1

JULY 1950

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

What's new

The Advertisers Index will be found on page 153

Chemical Industries is indexed regularly by Engineering Index, Inc., and Industrial Arts Index.

Cover: Jefferson Chemical Co.

ABP ABC

EDITOR: R. L. Taylor; BUSINESS MANAGER: W. A. Jordan

PUBLICATION STAFF: Managing Editor, Howard C. E. Johnson; Associate Editor, Herman W. Zabel; Assistant Editor, John J. Craig; Editorial Assistant, Barbara M. Bissell; Contributing Editors, T. Pat Callahan, Randall D. Sheeline; Production Manager, Olga E. Vaream. CONSULTING EDITORS: Robert T. Baldwin, Lawrence W. Bass, Benjamin T. Brooks, J. V. N. Dorr, Charles R. Downs, Ernest W. Reid, Norman A. Shepard. BUSINESS STAFF: New York, L. C. Todaro, Wm. B. Hannum, Jr., Richard F. Burkhart; Chicago, Frank C. Mahnke, Jr.; Los Angeles, Don Harway; Circulation Manager, Florence Sanders.

Published monthly at 1309 Noble St., Philadelphia 23, Pa., and entered as 2nd class matter July 15, 1944, at the Post Office at Philadelphia 4, Pa., under the Act of March 3, 1879. Subscription rates U. S. A. and Canada $5.00 a year, $8.00 two years, $10.00 three years. (Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100, Terminal A, Toronto, Canada.) Latin America add $2.00 per year for postage. Other foreign countries $15.00 one year, $30.00 three years. Copyrighted 1949 by MACLEAN-HUNTER Publishing Corporation, 522 Fifth Avenue, New York 18, N. Y. MUrray Hill 2-7888. Horace T. Hunter, President; E. R. Gauley, Vice-President; J. L. Frazier, Secretary. OFFICE OF PUBLICATION: 1309 Noble Street, Philadelphia 23, Pa. EDITORIAL & EXECUTIVE OFFICES: 522 Fifth Ave., New York 18, MUrray Hill 2-7888. DISTRICT OFFICES: Chicago: 309 West Jackson Boulevard, Chicago 6, Ill., HArrison 7-7890. Los Angeles: 1709 W. 8th St., Los Angeles 14, Calif., DUnkirk 2-8576. London: Sun Life of Canada Bldg., Trafalgar Square, London, S. W. 1, England.

A MACLEAN-HUNTER publication, Horace T. Hunter, President

THE READER WRITES

Thought Bears Fruit

To the Editor of Chemical Industries:

An editorial in your July 1949 issue suggested that companies give used equipment to colleges as gifts when unable to dispose of them otherwise. We thought you would be interested in knowing that this editorial planted a thought in the back of our minds that resulted in such a transaction.

R. D. PETTIBONE
G. D. Searle & Co.
Chicago, Illinois

Ammonia from Natural Gas

To the Editor of Chemical Industries:

On page 669 of your May, 1950 issue, a description is given of the increased ammonia production facilities of Spencer Chemical Co. and the statement is made that Spencer now is foremost in this country in capacity for ammonia from natural gas. We should like to call your attention to the prominence of Lion Oil Co. in the synthetic ammonia field and to the fact that Spencer, even with the newly acquired Henderson, Ky., plant, still ranks second to Lion in production from natural gas.

During 1949 Lion Oil Co. completed a large expansion in its ammonia facilities with the result that the ammonia production was increased 30% to the present 570 tons per day design figure. The annual capacity of this one plant, located at El Dorado, Ark., is therefore, 208,050 tons, 12,050 tons per year greater than the Spencer capacity at both Pittsburg and Henderson. This would make Lion, rather than Spencer, third to both Solvay and Du Pont.

C. H. DAVENPORT, Research Div.
Lion Oil Co.
El Dorado, Ark.

Synthetic Fibers

To the Editor of Chemical Industries:

I have just finished reading the article on synthetic fibers by W. P. ter Horst in your April issue. It constitutes a very useful summary of the fiber situation and should appeal particularly to non-chemists and to chemists not in the fiber field.

I do not agree completely, however, with the statement that new fibers are unlikely. I feel that there will still be a reward for the developer of a hydrophilic fiber with good wet strength, although the job of getting such a fiber will be extremely difficult.

There is another angle not dealt with by Dr. ter Horst: the modification of existing fibers to improve their properties. For example, cross-linking treatments on cellulosic fibers for improved wet stability and wrinkle-resistance. Such modified fibers might also be classed as "semi-synthetics," even when based on natural fibers.

J. H. DILLON, Director of Research
Textile Research Institute Labs.
Princeton, N. J.

Back Numbers of Chemical Industries

To the Editor of Chemical Industries:

I have for disposal files of Chemical Industries for about 15 years. They are unbound, but in good condition, and, I think, complete. Is there any educational or scientific institution that could use them and would be willing to pay the shipping charges?

A. T. MCPHERSON, Chief
Div. of Organic and Fibrous Materials
U. S. Dept. of Commerce

We will be happy to put in touch with Mr. McPherson any organization interested in taking advantage of his offer. —ED.

Waste Sawdust

To the Editor of Chemical Industries:

The article in your December issue on Fluidized Wood calls to mind what Rev. E. C. Good of this place told us in regard to the immense piles of sawdust that went to waste at the timber mills in Canada. Part of this material is burned in the boilers of the mills, but most of it is simply left to rot.

We hope in the near future some company will make use of this material, using the process given in this article.

No doubt this sawdust could be pressed into fuel briquettes, and a very small quantity of low-grade oil could be added to enhance the burning properties.

M. W. HILL, Chemist
B. H. K. Laboratories
Leechburg, Pa.

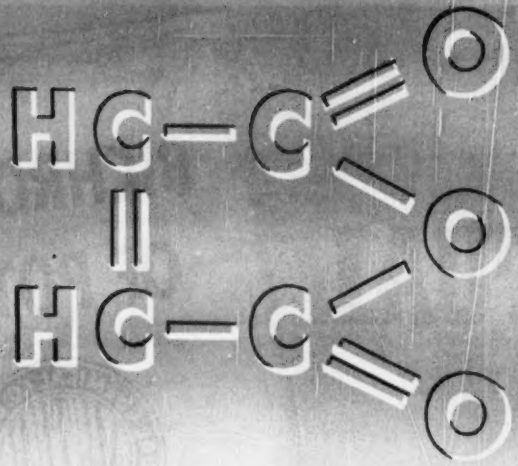
Wants Product Literature

To the Editor of Chemical Industries:

Would it be possible to make mention in your magazine that this organization is greatly interested in receiving all kinds of up-to-date literature covering plant and process equipment and basic materials in order to form a complete reference file for its members.

Camara Gremial de la Industria Quimica
San Jose 352
Buenos Aires, Argentina

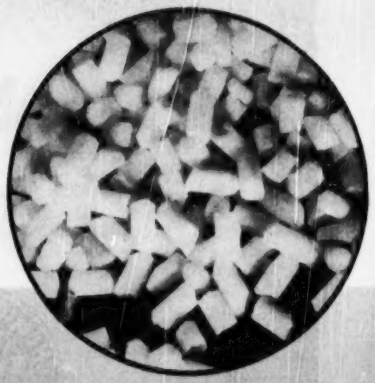

MUTUAL
BICHROMATE OF POTASH
MUTUAL CHEMICAL CO. OF AMERICA
NEW YORK N.Y.
270 Madison Avenue, New York 16, N. Y.
BICHROMATE OF SODA
MUTUAL CHEMICAL CO. OF AMERICA
NEW YORK N.Y.
MUTUAL CHEMICAL COMPANY OF AMERICA
270 Madison Avenue, New York 16, N. Y.
Bichromate of Soda
Chromate of Soda
Bichromate of Potash
Chromate of Potash
Chromic Acid
MUTUAL CHEMICAL COMPANY OF AMERICA
270 Madison Avenue, New York 16, N. Y.



New horizons for resins through modification with

MALEIC ANHYDRIDE

Hydrocarbons of the unsaturated type become increasingly important as resinous raw materials. Deficiencies in phenolic and urea formaldehyde, styrene, alkyd and vinyl resins for particular applications may be overcome by modifying with Maleic Anhydride.



National Aniline does not produce resinous compounds. But, as leading producer of Maleic Anhydride and other basic resin ingredients, we welcome inquiries that may develop new uses for these versatile chemicals.

National Aniline

NATIONAL ANILINE DIVISION

ALLIED CHEMICAL AND DYE CORPORATION

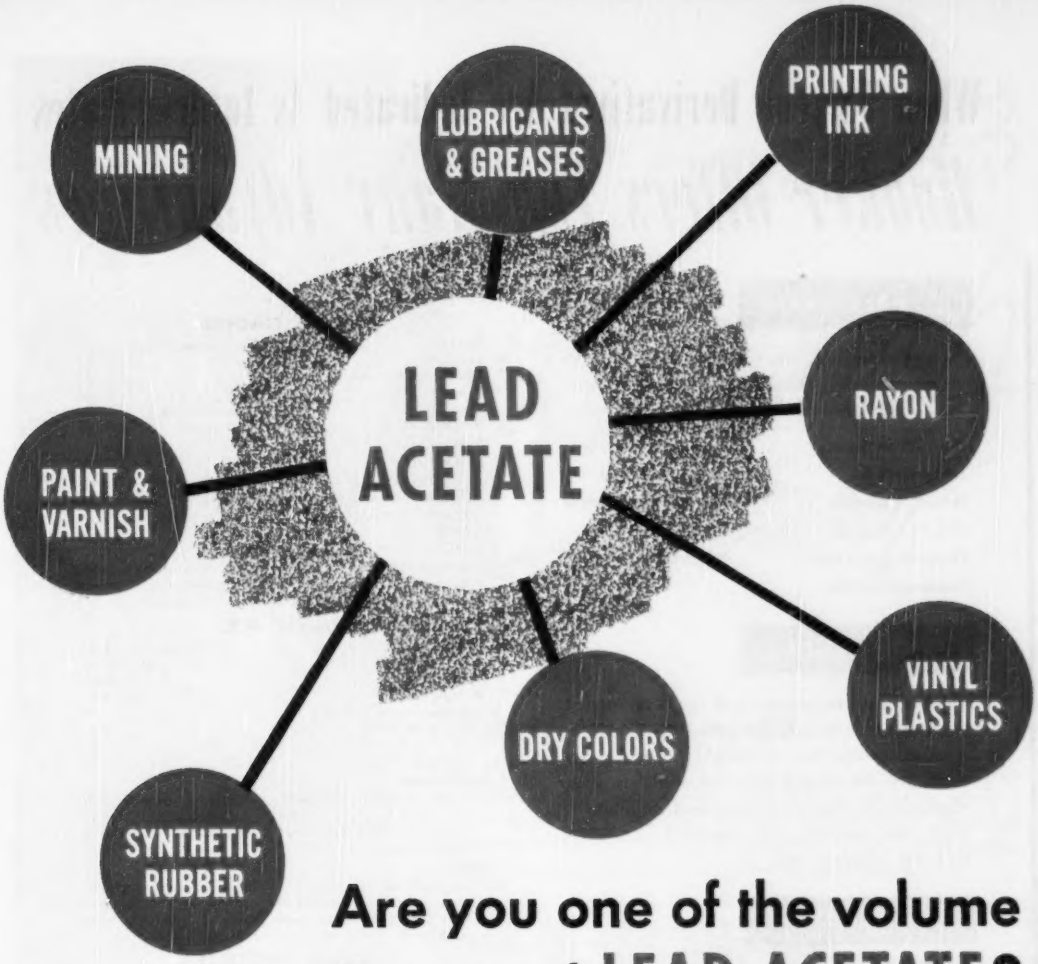
40 RECTOR STREET, NEW YORK 6, N.Y. • BOwling Green 9-2240

Boston 16, Mass., 100 Summer St. CApitol 7-0100 Richmond 19, Va., 6 North 10th St. Richmond 2-1050
Providence 1, R.I., 10 Westminster St. DExter 1-5060 Columbia, S.C., Columbia Interstate Bldg. Columbia 2-1010
Philadelphia 6, Pa., 200-204 S. Front St. Lombard 3-0202 Greensboro, N.C., Jefferson Standard Bldg. Gilmore 2-1510
San Francisco 5, Calif., 917 Howard St. SUtter 1-7007 Chattanooga 2, Tenn., James Building Chickamauga 5-4347
Portland 5, Ore., 730 West Burnside St. Broadway 1020 Atlanta 3, Ga., 140 Peachtree St. CYpress 2021
Chicago 54, Ill., Merchandise Mart Bldg. Superior 7-2007 New Orleans 12, La., Cotton Exchange Bldg. Raymond 7220
Charlotte, 1 N.C., 201-205 West First St. Charlotte 3-6201 Toronto 2, Canada, 137-143 Wellington St. W. Elgin 0465

NATIONAL MALEIC "RODS"

safer and easier to handle, less hydration, lower costs

PHTHALIC ANHYDRIDE
SUCCINIC ANHYDRIDE
MONOCHLOR MALEIC ANHYDRIDE
FUMARIC ACID
MALIC ACID
SUCCINIC ACID



Are you one of the volume Buyers of LEAD ACETATE?

Big volume users of Lead Acetate know the name, J. T. Baker Chemical Company, well. They know that the physical and chemical uniformity of this product aids in smooth plant operation.

Baker's popularity among big users of Lead Acetate stems from its unique position as a prime producer of Lead Salts for more than 20 years and its background in chemical exactness—practiced for nearly a half century.

If you purchase Lead Acetate or other Lead Salts in volume, investigate Baker quality and Baker prices. Our increased facilities will enable us to care for a number of the more exacting buyers.

J. T. Baker Chemical Co., *Executive Offices and Plant*, Phillipsburg, N. J., *Branch Offices:* New York, Philadelphia, Los Angeles, Boston, Chicago

Baker's Chemicals

C P ANALYZED · FINE · INDUSTRIAL

When Toluene Derivatives Are Indicated As Intermediates

Hooker Offers You Many Advantages

COMPLETENESS

As specialists in the manufacture of Toluene derivatives Hooker offers eleven products or intermediates giving you a wide choice from one source.

- Sodium Benzoate
- Benzoic Acid
- Benzyl Chloride
- Benzal Chloride
- Benzoic Anhydride
- Benzotrichloride
- Benzoyl Chloride
- Benzyl Alcohol
- Benzyl Thiocyanate
- Methyl Benzoate
- Monochlorotoluene

EXPERIENCE

Hooker's long experience with the development of chlorine derivatives has built a fund of technical knowledge that is available to you in determining the intermediate best suited to your requirements. End product desired, equipment, yield, cost, handling, etc., should be discussed with our technical staff.

QUALITY

The famous Hooker "S" Cell provides a continuous supply of high purity Chlorine. This, plus carefully selected raw materials and the special processing techniques developed over the years, makes Hooker intermediates the highest quality obtainable. This permits substantial savings in manufacturing by eliminating fluctuations due to quality variations.

Data sheets on Hooker Toluene derivatives are available when requested on your company letterhead. Bulletin 320 gives more details on the reactions of these products.

BENZYL CHLORIDE

Synonym	Alphachlorotoluene
Formula	$C_6H_5CH_2Cl$
Molecular Weight	126.5
Freezing Point	−43°C
Distillation Range	5° or less including 179.4°C
Refractive Index, n25/D	1.5365
Specific Gravity, 15.5°/15.5°C	1.107

DESCRIPTION

Colorless to light yellow liquid having a pungent odor. The above data are for the high grade product. Also available as a technical grade with a wider distillation range.

USES

In manufacture of intermediates, dyestuffs, perfume bases, plasticizers, resins, wetting agents, rubber accelerators, gasoline gum inhibitors, pharmaceuticals.

BENZOIC ACID

Synonym	Phenylformic Acid
Formula	C_6H_5COOH
Molecular Wt.	122.1
Melting Point	122.0°C
Solubility, gms/100 gms	
Water at 18°C	0.27
Alcohol at 15°C	32
Ether at 15°C	40

DESCRIPTION

White, odorless, crystalline solid, sold in powdered form. U.S.P. grade meets requirements of U.S. Pharmacopeia XIV. Technical grade does not quite meet these requirements.

USES

Dyestuff intermediate, manufacture of perfumes and pharmaceuticals, manufacture of benzoates; preservative for textile sizing, foods, cosmetic creams, lotions, antiseptics, dentifrices, and other pharmaceuticals.

SODIUM BENZOATE

Synonym	Benzoate of Soda
Formula	C_6H_5COONa
Molecular Wt.	144.0
Solubility, gms/100 gms	
Water at 25°C	62.5
Alcohol at 25°C	2.3

DESCRIPTION

Hooker Sodium Benzoate is a white, odorless, crystalline solid in flake or powdered form. Available in two grades, U.S.P. and Technical.

USES

Chemical intermediate; preservative for foods, and as an antiseptic in pharmaceutical and cosmetic preparations. Also recommended as a corrosion resistant additive for certain solutions.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

HOOKER CHEMICALS

3 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

10-910

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM BENZOATE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

Fight him these 3 Pittsburgh ways!

Pittsburgh Toxaphene-60

A standardized liquid emulsifiable concentrate containing 60% by weight (6 lbs. per gallon) Toxaphene, specifically designed for use where a water spray application is adaptable and practical. *Pittsburgh* Toxaphene-60 spray concentrate possesses the advantages of marked residual action and is effective on a wide range of insects.

Pittsburgh 45% Chlordane

A 45% Chlordane emulsion concentrate containing 45% by weight (4 pounds per gallon) Chlordane, prepared especially for dilution with water where spraying applications are required. *Pittsburgh* 45% Chlordane Emulsion Concentrate with its residual action for long protection is an effective control for many insects.

Pittsburgh 15% Parathion

A 15% Wettable powder formulated under scientific control to give a uniform product with the ability to quickly disperse and remain in suspension. Consult local agricultural authorities concerning usage of Parathion.

WRITE TODAY FOR BULLETIN [illegible]

PITTSBURGH AGRICULTURAL CHEMICAL COMPANY
Empire State Building • 350 Fifth Avenue • New York 1, New York

Division of

PITTSBURGH COKE & CHEMICAL COMPANY
1952 Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS, ACTIVATED CARBON, NEVILLE COKE, EMERALD COAL, PIG IRON, GREEN BAG CEMENT, CONCRETE PIPE AND PRODUCTS

Life ...on the

CANASTA, South America's gift to card playing North Americans, has established itself as one of this country's most popular new games. But cards, of course, have always been the implements of a popular pastime. Far more than bits of pasteboard, their manufacture is a highly scientific process backed by continuing research in production technique. One approach to the latter suggests an investigation of Dicyandiamide, made by Cyanamid, in connection with adhesives—as a strengthener, viscosity stabilizer, rewettability improver, and for its non-hygroscopic characteristic. Further information on the uses of "Dicy" in adhesives is available on request.

SHOWER CURTAINS like the one shown by the young lady have to be soft, flexible and able to take a lot of wear before the consumer will buy them. Where low vapor pressure, low brittle point, good compatibility, and flexibility of vinyl film over an extreme temperature range are essential AERO* DOP Di-2-ethylhexyl Phthalate, made by Cyanamid, answers the problem of plasticizing vinyl resins—for use in a wide variety of products... from shower curtains to adhesives, drapery materials to extruded tubing.

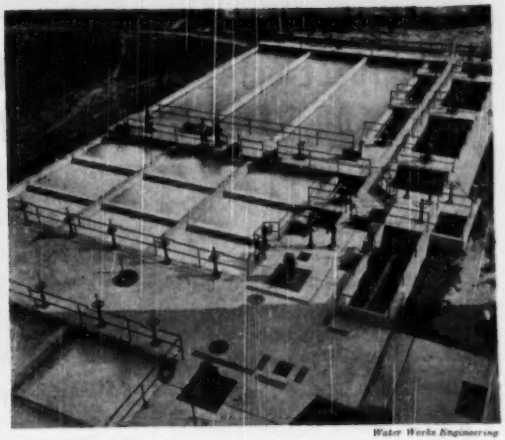
AERO DOP is also an excellent plasticizer for nitrocellulose and synthetic rubber, where good tensile strength, low temperature flexibility and resistivity are desired.

*Trade-mark

SMOOTHER LANDINGS in bad weather are made possible by the Sperry A-12 Gyropilot which will guide the plane right down to the runway. Essential insulating parts for that instrument are made from MELMAC® Plastic 592, produced by American Cyanamid Company. This versatile material has a wide range of uses in industrial and electrical product design and may provide the solution to your problem. Write now for more information.

Chemical Newsfront

THE WET STRENGTH TEST shown in the photo was made at Cyanamid's Stamford Research Laboratories. Two weights were suspended from paper tape and immersed in water. The weight on the left, suspended from paper tape treated with PAREZ® Resin 607, had not torn from its tape—after more than two years of suspension in water. The one on the right, suspended from untreated paper, broke its tape shortly after immersion. If you are interested in a paper with high wet-strength suitable for packing items varying from ice cubes to potatoes, and with characteristics making it ideal for purposes such as frozen food wraps, investigate PAREZ Resin 607. The coupon is for your convenience.



Water Works Engineering

AN IMPORTANT STEP IN WATER PURIFICATION at many municipal and industrial water works takes place in settling basins like those shown. Cyanamid's AERO* Aluminum Sulfate has long been considered a requisite by many engaged in water purification. It has a wide pH range (6.0 to 9.0) of effective flocculation—is most effective in the treatment of water at low pH for the removal of color—provides very satisfactory coagulation in the treatment of water in the upper limits of the pH range.

*Trade-mark

American Cyanamid Company
Industrial Chemicals Division
30 Rockefeller Plaza, New York 20, N. Y.

Please send literature or further data on the products checked:

- ☐ MELMAC® Plastic Molding Materials
- ☐ AERO* Aluminum Sulfate for Water Purification
- ☐ AERO* DOP for plasticizing vinyl resins
- ☐ Dicyandiamide for use in adhesives
- ☐ PAREZ® Resin 607 for wet-strength papers

Name.....

Company.....

Address.....

C. I. 7-50

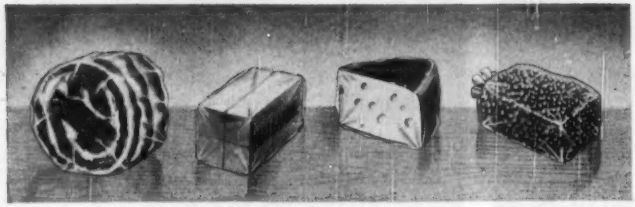
AMERICAN *Cyanamid* COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.

For Your Information

Every month Monsanto publishes these pages of pertinent information, selected to help you improve your products, lower your production costs, increase your sales.

SANTICIZER 141 MAKES VINYL FILMS SAFE FOR PACKAGING VARIOUS FOODS



Acceptance of Santicizer* 141 by the Meat Inspection Division of the Bureau of Animal Industry, U. S. Department of Agriculture, as a nontoxic plasticizer for use in plastic products which may come in contact with meat, opens the way for the production of vinyl films that will bring improved packaging to margarine, meat, cheese, cranberries and numerous other food products.

In addition, the approval is assurance of the nontoxicity of Santicizer 141 in *any* application where such quality is desirable. Other qualities delivered by Santicizer 141 include: 1. Flame resistance. 2. Softness and drape. 3. Resistance to weather. 4. Low-temperature flexibility. 5. Light stability. 6. Low volatility. 7. Resistance to embrittlement. 8. Strength, elasticity and abrasion resistance. In many cases, Santicizer 141 improves processing.

Emulsifiers step up efficiency of sprays

Insecticides, fungicides and herbicides can be used more efficiently, with economy and a minimum of effort, through the use of Monsanto emulsifiers and wetting agents.

Most toxicants used in formulations of herbicides, insecticides and mothicides cannot be dissolved in water. The practice is to concentrate these toxicants in oil or an organic solvent and to use relatively small amounts of the formulations in water for spraying. Adding Monsanto emulsifiers and wetting agents to the formulations results in excellent emulsions that spread more evenly and have better adherence. If you are a formulator, mail the coupon for a free copy of Technical Bulletin No. P-142.

Research Chemists' Corner

You may find something new here

If you are interested in new chemical discoveries, have a look at the specifications of Methyl-para-Toluenesulfonate. The specifications may suggest research that will lead you to the development of a new chemical product . . . or the improvement of an existing product. If you want further information or a sample, mail the coupon.

Methyl-para-Toluenesulfonate

Structural Formula:

Molecular Weight: 186.22

Properties:

Crystallizing Point:	Approx. 25° C.
Color:	Approx. 100 APHA
Chlorine:	0.01% Max.
Acidity as TSA:	0.01% Max.
Saponification Value	186.0 — 187.5
Sp. Gr. at 25/25° C. (super-cooled liquid)	1.225 — 1.227

Suggested Uses: Dye intermediate, alkylating agent, catalyst for alkyd and other organic ester preparations, photographic chemicals, and pharmaceutical intermediate.

Santomerse No. 1, all-purpose detergent and wetting agent, available in three densities

Extensively used as an ingredient in industrial cleaning compounds and as a wetting agent and surface-active agent, Monsanto Santomerse* No. 1 now is available in three densities. These include a granular Santomerse No. 1, designed especially for easy mechanical blending.

Santomerse No. 1, which contains a minimum of 40% active material, does a thorough job of cleaning. It lifts out particles of grease and grime and holds them in suspension so that they cannot be redeposited. Santomerse No. 1 rinses out easily and thoroughly. It is effective in hard or soft, hot or cold water and in acid, neutral or alkaline solutions. It has been found effective in temperatures ranging from below zero to above the boiling point.

For additional information on Santomerse No. 1, mail the coupon or contact the nearest Monsanto Sales Office.

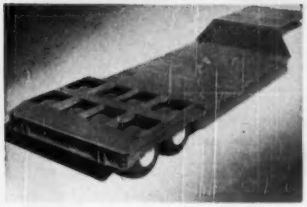
HB-40 cuts plasticizer cost in clear vinyl film

Monsanto HB-40 (partially hydrogenated terphenyl) is practically water-white, making it attractive for plasticizing vinyl films that are transparent or which are to be brilliantly colored. Since HB-40 is extremely low in cost and since it can replace substantial amounts of the primary plasticizer, it can be used to reduce production costs. This savings in costs can be attained without a reduction in quality.

HB-40 is low in toxicity, gives a dry "hand," increases tensile strength, has excellent electrical properties and is highly resistant to moisture. It is nonmigratory.

HB-40 gives excellent results in extrusions, organosols and vinyl injection moldings as well as in films. For further information, mail the coupon or contact the nearest Monsanto Sales Office.

Penta protects deck of 54-ton trailer



The deck of this 54-ton, drop-frame trailer has to be strong . . . and stay strong. That's why its manufacturer, La Crosse Trailer Corporation, La Crosse, Wisconsin, protected the 2½" oak decking with a formulation of Monsanto Penta (pentachlorophenol). Penta protection is a clean treatment that guards wood against termites and other wood-boring insects . . . against the attack of fungi that cause wood decay. Penta can be applied by brushing, dipping or pressure methods. It is a chemically stable treatment that cannot be washed away by rain or ground water. Properly formulated penta treatment leaves wood paintable. If you have a problem of wood preservation, it will pay you to investigate Monsanto Penta. For further information, mail the coupon or contact the nearest Monsanto Sales Office.

Mold in soap wrappers stopped by Santobrite

For as many years as manufacturers have been wrapping bar soaps, they have been plagued by the action of fungi in their wrapping papers. The use of as little as 2.0% (on weight of casein in size) of Santobrite* (sodium pentachlorophenate, technical) controls these microorganisms in casein-coated papers. The addition of Santobrite in the paper stock and in the glues used for sealing also is recommended.

Investigate the possibilities of Santobrite as a means of solving your problems of mold in soap wrappers. For further information, mail the coupon or contact the nearest Monsanto Sales Office.

FOR YOUR LIBRARY

Timely Monsanto publications, listed below, will be sent to users of chemicals on request . . . free and without obligation. Indicate the literature you want on the coupon.

* * *

Technical Bulletin No. O-33—Contains information on Santolube* 31, an additive for use in hydraulic oils, rust preventives, cutting oils, stationary engine lubricants and others.

* * *

Technical Bulletin No. O-52 — Describes Niran,* Monsanto's parathion, an agricultural insecticidal chemical.

* * *

Technical Bulletin No. O-62—Giving information on Santolene* C, a newly developed metal corrosion inhibitor for light petroleum products.

* * *

Technical Bulletin No. P-133—Gives data on Sterox* SE and Sterox SK, 100% active, liquid, nonionic-type, surface-active agents, wetting agents, emulsifiers and detergents.

* * *

Technical Bulletin No. P-129—Presents technical data on Sterox CD, a nonionic-type, liquid, 100% active emulsifier, detergent, surface-active agent.

* * *

Technical Bulletin No. O-16—Featuring Santomask* II for "after-odor" control of paint, printing ink and other compositions.

* * *

Technical Bulletin No. O-D-601—Data on OS-16, flame-resistant hydraulic fluid.

* * *

Technical Bulletin No. P-146—Describing the use of Santomerse S for metal processing in acid media.

* * *

Technical Bulletin No. P-101—Featuring SA-326, an antioxidant for soaps.

New furnace steps up phosphorus production

A new electric furnace, world's largest, is being built by Monsanto Chemical Company at Monsanto, Tennessee, where the company produces phosphorus of better than 99.9% purity. Monsanto converts phosphorus into phosphoric acid and various phosphates.

Here's a new service for the food industry

A new laboratory to study the application of chemicals in foods has been set up by Monsanto at Anniston, Alabama, and is ready to work on such problems for the food industry. There is no charge for investigational work by the laboratory, one of the few such establishments in the chemical industry.

The illustration shows Dr. Roy E. Morse, food technologist, conducting an experiment in tomato canning. For further information, mail the coupon.

*Reg. U. S. Pat. Off.

MONSANTO CHEMICAL COMPANY, 1703-G South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO
CHEMICALS for PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

INFORMATION: ☐ Santicizer 141. ☐ Santomerse No. 1. ☐ HB-40. ☐ Penta. ☐ Santobrite. ☐ Food Laboratory.

LITERATURE: ☐ Bulletin P-142 (Emulsifiers). ☐ Bulletin O-33 (Santolube 31). ☐ Bulletin O-52 (Niran). ☐ Bulletin O-62 (Santolene C). ☐ Bulletin P-133 (Sterox SE & SK). ☐ Bulletin P-129 (Sterox CD). ☐ Bulletin O-16 (Santomask II). ☐ Bulletin P-146 (Santomerse S). ☐ Bulletin P-101 (SA-326). ☐ Bulletin O-D-601.

SAMPLE: ☐ Methyl-para-Toluenesulfonate.

MONSANTO CHEMICAL COMPANY
1703-G South Second Street
St. Louis 4, Missouri

Please send information indicated at the left.

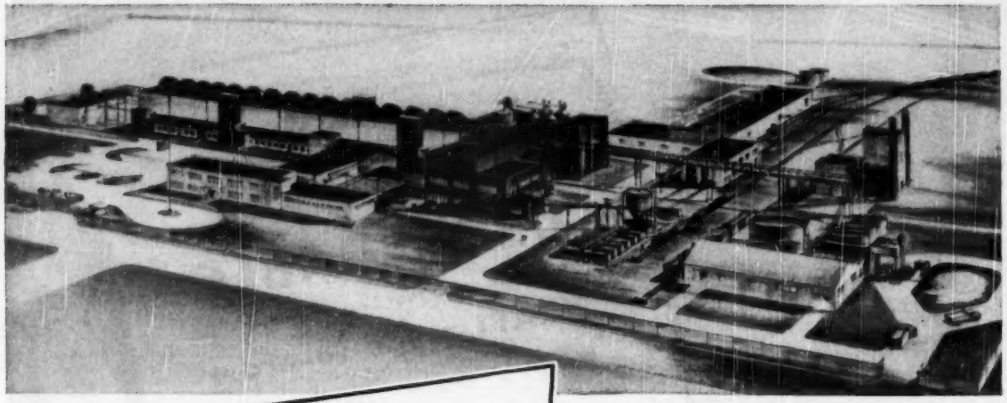
Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....


DEPENDABLE
is the word that best describes
KRAFT made-to-order
heavy-duty multi-wall
shipping sacks
produced in our new plant at St. Marys, Georgia
DEPENDABLE bag paper . . . made to exacting specifications in our own mill
DEPENDABLE bag design . . . by our own practical packaging engineers
DEPENDABLE workmanship . . . by personnel with long experience in multi-wall bag construction
DEPENDABLE plate-making, and dependable printing with improved presses and inks
DEPENDABLE deliveries and service . . . by rail or water right from our own doorstep.
• Sewn or pasted—valve or open mouth—2 ply or up to 6 ply . . . you can depend on "Kraft" both as a source of supply and as a source of complete satisfaction.
KRAFT BAG CORPORATION
A DIVISION OF GILMAN PAPER CO.
630 Fifth Ave., New York 20, N.Y.
Western Sales Office
Daily News Bldg., Chicago 6, Ill.
Plants at St. Marys, Georgia and Gilman, Vermont
KRAFT BAG CORPORATION
Gilman PAPER CO.
• St. Marys Kraft Corp.
• Gummed Tape Div.
• The Gilbound Corp.
• Kraft Bag Corp.
The long, white building in the foreground is the newly completed addition to the Kraft Bag Corporation's plant in St. Marys, Georgia
Send your product to market in a "KRAFT BAG"—the container for a thousand uses!



METALLIC sodium

available for immediate delivery

National Distillers Chemical Corporation's new plant at Ashtabula, Ohio, is now operating and producing sodium metal of the highest purity.

Our production, research and technical service personnel offer experienced assistance in all matters of handling and use of sodium.

Inquiries relating to sodium will receive our prompt attention.

NATIONAL DISTILLERS CHEMICAL CORPORATION

EXECUTIVE OFFICES: 120 BROADWAY, NEW YORK 5, N. Y.
RESEARCH LABORATORY: CINCINNATI, OHIO
PLANT: ASHTABULA, OHIO

Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
July, 1950

First of the three new ethylene oxide-glycol units Carbide and Carbon Chemicals Division is building (CI, Feb. 1950, p. 175) went into operation at Whiting, Ind., June 19. Another unit at Whiting and the third, at Institute, W. Va., will come on stream during the last quarter of the year.

The evolution is coming as a result of car owners' demands for ever-increasing "gas" octane ratings. Improvement by addition of branched-chain paraffins has almost reached the limit, and further gains must come by increasing the proportion of aromatics. It is reported that several refiners definitely plan to install such processes as Platforming to convert gasoline stocks to aromatics. Since gasoline needs are colossal compared to chemical requirements, chemical users of aromatics will be the gainers when refiners offer them the inevitable surpluses.

* * CI * *

Another polyethylene producer? Standard Oil Co. of Indiana has a pilot plant, but it hasn't yet decided whether or not it will proceed with a commercial plant. Standard has some patents in the field, issued last year. One polyethylene patent of more than passing interest: U. S. No. 2,504,400, assigned to Allied Chemical & Dye Corp., which describes the synthesis of medium- and high-melting waxes from ethylene at 140 to 200 degrees C. and 425 to 475 atm. pressure in the presence of isopropanol containing hydrogen peroxide.

Look for another entry in the fluoroplastics field. Unlike the materials obtainable from existing sources, this product can be produced only in liquid form, both as a solution and as a suspensoid.

You can expect to hear more about a new, quite different design for sulfuric acid plants. Chemical Construction Corp. has just completed a plant embodying the new design at Hamilton, Ohio, for American Cyanamid Co.

* * CI * *

A new alcohol synthesis--homologation--is under study by the U. S. Bureau of Mines. In this process higher-molecular-weight alcohols are made from lower members of the series by reaction with carbon monoxide and hydrogen. Oxo-type catalysts and conditions are used. Tertiary alcohols react most rapidly; primary, most slowly. Methanol is an exception, reacting rapidly to give good yields of ethanol and small quantities of methyl and ethyl acetates.

Heico, Inc., Stroudsburg, Pa., will shortly introduce on a national scale a new water-soluble, liquid ion-exchanger that prevents deposition of calcium, magnesium, and iron salts from water. Called Distol 8, the product is a mixture of a sequestering agent and a polyether alcohol. Heico has previously confined its activities to the photographic chemicals field.

Textile Colors Division of Interchemical Corp. has started operation of its new dyestuffs and pigmented resin colors plant at Hawthorne, N. J., which supplants operation previously carried out at Fairlawn and Paterson, N. J. Certain intermediates are still being made at the Paterson location.

* * CI * *

How large is Jefferson Chemical Co.? A recent SEC statement gives a partial answer to the oft-asked question: Texas Co.'s share (presumably 50%) of gross income from Jefferson was $7 million in 1948, and net was $370,000. The 1949 gross was not given, but net income was smaller ($211,000)--doubtless a result of Jefferson's long strike.

Big names in the cosmetics field are switching to aerosols. Dorothy Gray now sells a push-button personal deodorant, called Aeromist Deodorant, at 2 oz. for $1. Indirect bonanza for household specialty makers: Women's increasing familiarity with aerosol toiletries should speed acceptance of aerosol waxes, lacquers, air deodorants, insecticides, and all the rest.

A bang-up year for insecticides is in the offing--unless a change in the weather kills off the bugs without chemical help. DDT makers, spurred by a corn borer and cotton insect threat as well as low carry-over stocks, set an all-time production record of over 6 million lbs. in April. Only brake on even larger output was shortage of benzene and chlorine.

* * CI * *

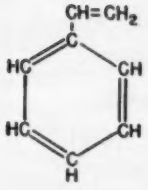
Here and There:

In a recent luncheon-table poll of chemical leaders, the following branches of the industry were voted most likely to see spectacular development over the coming decade: synthetic fibers, agricultural chemicals, food chemicals, synthetic drugs, resins, aromatics from petroleum and acetylene derivatives....Monsanto is looking at sites in Utah and Idaho for possible electric-furnace phosphorus operations....Expect more dislocations in the market for imported chemicals and raw materials as a result of the Korean war; it has already caused a heavy run on shellac....Although many experts feel that organic fluorine compounds will never be more than small-poundage specialty items, examination of "New Chemicals for Industry" submitted for CI's annual special issue next month shows that research and development activity in that field remains at a high level.

Interesting syntheses of potential commercial importance are revealed in recent patents: A carboxylic acid anhydride is formed from a carboxylic acid, carbon monoxide, and mono-olefin in the presence of nickel carbonyl (U. S. No. 2,597,304, Du Pont)....Propionaldehyde can be made by dehydrating 1,2-propylene glycol (U. S. No. 2,501,042, Celanese)....Thiophenes are obtained by reaction of sulfur oxides with four-carbon hydrocarbons (B. P. No. 627,247, Texaco)....Pyrolysis of urea gives a 76-82% yield of melamine (B. P. No. 628,255, Du Pont).

The Editors

If you make



Koppers Styrene Monomer is worth investigating

● Koppers Styrene Monomer is known best through its extensive use in the preparation of polystyrene molding materials and in the production of GR-S type synthetic rubbers. But this unsaturated, aromatic hydrocarbon offers you many other chemical possibilities as a polymer and copolymer.

Styrene Monomer finds valuable application in the formation of polyester laminating and casting resins, ion exchange resins, and styrenated alkyds, or drying oils, for protective coatings. As an intermediate, Koppers Styrene Monomer enters into many reactions leading eventually to a wide variety of chemical products.

The extensive styrene-producing facilities of Koppers Chemical Division make it possible to offer you this compound in a highly-pure state at a low, commercially-practical price. It will pay you to investigate the possibilities of Koppers Styrene Monomer. For complete information on the properties, reactions and uses of Styrene Monomer, write for Bulletin C-8-119. Please send your request to Koppers Company, Inc., Chemical Division, Dept. C1-7, Pittsburgh 19, Pa.

KOPPERS

KOPPERS COMPANY, INC., CHEMICAL DIVISION, PITTSBURGH 19, PA.

Editorial CI

PUBLIC RELATIONS FOR THE CHEMICAL INDUSTRY

by ***ROBERT L. TAYLOR, Editor***

THE FAVORABLE REACTION to the Manufacturing Chemists' Association's announced intention to step up its chemical industry public relations activities is an encouraging sign. A number of industry leaders have been arguing for some time for an intensification of effort in this direction—on both an industry and an individual company basis.

Two circumstances in particular make increased public educational efforts by the chemical industry especially timely right now.

One is the fact that the tremendous growth of chemical manufacturing during and since the war has catapulted this industry into top spot in the country. As such it is almost certain to come under closer scrutiny by the public, by government, and by those whose avowed intention is to tear down and discredit private industry.

It becomes of first importance, therefore, that chemical manufacturers get their story across to their employees, their customers, their stockholders and the general public accurately and without delay. There is much evidence that a genuine desire for such information exists. Today's public is showing greater interest than ever in scientific and industrial material in newspapers, magazines, and other educational media.

And the chemical industry does have a tremendously worthwhile story to tell.

No industry has done more to advance the material comforts and welfare of the American people. No industry has gone to greater lengths to make its plants safe, healthful and desirable places in which to work. And it is doubtful that any industry—or public body, for that matter—has put forth greater effort to find practicable solutions to the urgent and difficult problems of air and stream pollution that have grown out of the congestion of many of our important industrial areas.

But alongside this emergence of what is already being referred to in the popular press as America's No. 1 industry is another development which brings out perhaps even more pointedly the need for an informed public opinion on matters pertaining to the way the chemical industry conducts its business.

That is the deadly grip of partisan influence that is rapidly transforming our courts of law into implements of a political philosophy. The administration in Washington is stepping up its attacks on business and business leadership, and it is using the courts to help it. An increasing number of Supreme Court decisions have not only placed additional burdens and restrictions on business but have given the stamp of legal sanction to broad new concentrations of economic power in government. Under such circumstances there is but one court of last appeal, and that is the court of public opinion. Unless American business takes its case to this higher court, it is headed for an unknown fate, "unwept, unhonored, and unsung."

In speaking of chemical industry public relations, however, one point should be made clear. That is regardless of the extent to which centralized activities may be carried out by the Manufacturing Chemists' Association, or by any other industry or professional organization (of which at least one is already doing outstanding work), the principal burden must continue to be shouldered by individual companies. For it is they who constitute "The Chemical Industry."

Effective industry public relations is essentially a grass roots thing. It is the composite result of good relations on the part of tens and hundreds of companies, some big and some small, with their employees, their customers, their local townspeople, and the general public. Where cooperative work through a trade association can be most effective is in carrying the story of the industry as a whole to the broader reaches of the public. That is doubtless where the emphasis of MCA's activities will be placed.

Most important, however, is that the efforts of all—individuals as well as companies and associations—be bent to the task. The chemical industry has an important story to tell. Now is the time to tell it.

in paper manufacture — Only a small amount of Tributyl Phosphate is required—usually less than 0.1% by weight based on the solids, depending on the application involved. Thus, a minimum of Tributyl Phosphate remains in the final product with no residual odor. Because of its high efficiency, Tributyl Phosphate is the preferred anti-foam in the paper industry.

tributyl phosphate

ANTI-FOAM AGENT

Tributyl Phosphate is an odorless, colorless liquid, is miscible with most common organic solvents, and is a good solvent for a variety of other materials. It has a surprisingly low melting point for such a high-boiling liquid.

for synthetic latex paints

Addition of a fraction of 1% (based on solids) to this type of paint reduces foaming during application and improves the leveling characteristics of the paint film. Synthetic latex paints sometimes tend to coagulate during application and Tributyl Phosphate minimizes this tendency.

other uses —Tributyl Phosphate has helped solve many industrial foam problems encountered in the manufacture of such products as—inks, textile sizings, casein solutions, water-soluble adhesives, and rubber latex.

SPECIFICATIONS

Specific Gravity at 20°/20°C .....0.973 to 0.983
Acidity as Phosphoric Acid.....0.05% by wt. max.
Water .....No turbidity when one volume is mixed with 19 volumes of 60° Be. gasoline at 20°C.
Color .....Water-white

PROPERTIES OF COMMERCIAL GRADE MATERIAL

Boiling Point at 27 mm. of mercury .....177°-178°C
Melting Point.....Below —80°C
Flash Point, Cleveland Open Cup: 294°F
Viscosity at 25°C.....3.41 centipoise at 85°F.....38.6 Saybolt seconds
Dielectric Constant at 30°C 7.97
Weight per U. S. Gallon ..... 8.13 pounds at 68°F
Solubility in Water ..... 0.6% by volume at 25°C
Solubility of Water in Tributyl Phosphate ....Approx. 7% by volume at 25°C

WRITE, WIRE, OR PHONE CSC TODAY FOR A SAMPLE AND FURTHER DATA

COMMERCIAL SOLVENTS CORPORATION · 17 EAST 42nd ST., NEW YORK 17, N.Y.

PRODUCTS OF THE INDUSTRIAL CHEMICAL DIVISION
Ethyl Alcohol & Derivatives · Acetone · Butanol & Derivatives · Formaldehyde
Methanol · Amines · Nitroparaffins · Crystalline Riboflavin

CSC

What's new

SULFURIC ACID: BIGGEST NOW BIGGER

The current record production of sulfuric acid is not due to any one factor but to good business in all fields.

STARTING from last December's all-time high (up to then) of 32,000 tons per day, sulfuric acid output has increased steadily through the first four months of 1950 to an average of 35,000 tons per day in April. Later statistical reports are not available, but there is little question but that this astonishing rate of production has been maintained since that time. And there is reason to believe that producers would make more if they had the capacity.

Supporting this thesis is the fact that acid is being shipped all the way from the Gulf Coast to the Midwest to meet the worst shortages the St. Louis, Detroit, Cleveland, and Chicago areas have ever known. Acid makers and users are ordinarily reluctant to ship more than a few miles, for sulfuric acid has such a low unit value that moving it only a few hundred miles means a sizable price increase.

No Seasonal Letdown

Another sign of the times: For the first time since 1947 production has failed to follow the normal seasonal drop in April that follows fertilizer plant shutdowns. This year April production remained at the peak, considering the shorter month.

Construction outlook affirms the vigorous health of industry's bellwether. Normally late spring and early summer is a slack season both for construction starts and inquiries. This year it's different. During the past month, more inquiries about new acid capacity have come to one of the biggest acid plant builders than in the several preceding months combined. Not all of these have developed into new business, of course, but some have approached the final dollar-and-cents stage. With the exception of synthetic ammonium sulfate, there has been no sudden burgeoning of any one use; rather there have been small increases in practically every category.

Production of synthetic ammonium sulfate has advanced from about 2000 tons per day to the most recently reported (April) level of 4000 tons per day. This increase requires about 1500 tons per day of acid in addition to that utilized last year. However, production of synthetic ammonium sulfate has already passed its peak (6000 tons per day in Dec., 1949 and Jan., 1950) and, probably will decrease still further as fixed nitrogen producers swing over to products with a higher nitrogen content. Even with this outlet lost, acid production will still be at a record pace.

Pigment and Fertilizer

Phosphate fertilizers, largest consumer of sulfuric acid, have been moving at a peak rate.

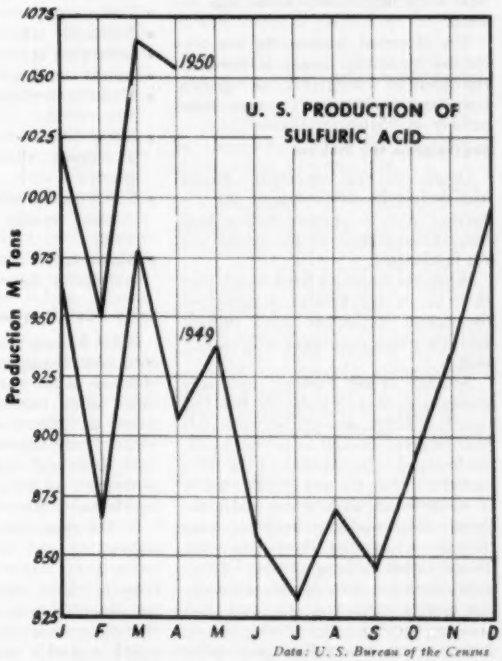
Howevver, the question continues to recur, "Does consumption equal production?" Although latest reports on inventories are not available, some in industry believe they are rising.

Titanium pigment production, although continually increasing, cannot fill all demands. A brief respite in acid demand for this use is promised when the high-titanium slag from Quebec Iron and Titanium Corp.'s furnaces at Sorel, Quebec, becomes available in the near future (*CI, Jan. 1950, p.24*). However, many feel that the industry is expanding so rapidly that it will soon absorb this production.

Petroleum, Pickling and Rayon

Petroleum refineries are operating at a near-record pace. Metal-working plants, which require huge quantities of acid for descaling purposes, are processing maximum tonnages of steel and other metals. Viscose rayon and cellophane are running at full capacity. Synthetic detergents are using more and more acid both for making the detergent itself and in manufacture of some of the phosphate builders. (About half of phosphoric acid production produced by the wet process, and recently some of this is reported to be moving into this use.) Neither need appears satiable.

And so it goes. Demand is climbing in practically every major use for sulfuric acid, and such a widespread high demand means business is booming.



THE SULFURIC PEAK: Business is booming.

SINGLE BED

Mixed-bed deionization proved commercially feasible, shows advantages over two-step process.

ION-EXCHANGE resins are giving up twin beds. Urged to greater intimacy by Rohm & Haas Co., Philadelphia, they are proving to work better at close quarters than they ever did apart.

After collaborating for a couple of years with several equipment manufacturers on the development of Monobed deionization, Rohm & Haas last month decided that it was time to tell the world about the new process.

Many "Theoretical Plates"

Ion exchange is an equilibrium reaction, and it is patently impossible to remove all the anions, say, in one pass through an anion exchange resin. Virtually complete deionization in the past has required passage of the solution through a long series of columns consisting of alternate beds of cation and anion exchangers. In such systems ion concentration of the solution is decreased in stages analogous to the "theoretical plates" of distillation theory. Using a great many columns is commercially impracticable, but it has been common practice to use four beds when high-quality water was desired.

The Monobed, wherein the two resins are intimately mixed, is therefore equivalent to a long series of separate beds—and analogous to a very large number of "theoretical plates."

Regeneration the Problem

Origin of this essentially simple idea is lost in dim antiquity, but reduction of it to practice took a long time. Regeneration of the resins was the bottleneck.

While the resins are used mixed, they have to be regenerated separately—the cation exchanger with sulfuric acid, the anion exchanger with caustic soda.

Solution of the problem, as finally worked out, was to make the two resins of different density, with the difference great enough to permit a simple hydraulic classification of the resin particles. After the bed is exhausted it is backwashed with water until the lighter anion-exchange resin has risen to form a separate layer above the denser cation-exchange resin. Caustic soda solution is then introduced at the top, regenerating the top layer and passing through the bottom layer. After a water rinse sulfuric acid is introduced at the interface of the resin

MONOBED: The kitchen as well.

layers so that it passes over the cation-exchanger only. The boundary between the resins is always at the same height, of course, so an acid distributor can be fixed at that height. After a final rinse the resins are re-mixed by agitation with air and the bed is again ready for use.

Lower Cost Claimed

Advantages claimed for Monobed operation can be summarized briefly:

- Lower operational costs.
- Lower equipment costs.
- Extremely simple operation.
- Controlled quality of effluent.
- Lower rinse requirements.
- Uniform performance in intermittent service.
- Sharp breakthrough of ionic solids at endpoint, allowing full use of capacity.
- Same quality effluent regardless of influent quality or regeneration level.
- Maintenance of a pH close to neutral during deionization.

Commercial Progress

Rohm & Haas has designed six Monobed systems employing different combinations of two cation exchangers and three anion exchangers. The series meets all effluent requirements from water of extremely high purity (equivalent to several distillations in quartz apparatus) to deionization of process liquids and treatment of wastes.

In the meantime over half of the engineering and equipment manufacturing firms concerned with deionization are either designing or developing Monobed systems or already are offering commercial units. Just this month a double unit of 5′ diameter started turning out 150,000 gallons per day of extremely pure water for General Electric Co.'s lamp division.

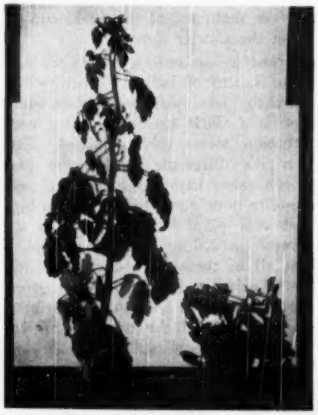
Rohm & Haas and the various equipment makers are stalking big game: the thousands of firms and municipalities that have to purify water or process liquids. But even the housewife and her steam iron haven't been neglected. An inexpensive "throw-away" demineralizer, with a color indicator to signal exhaustion, will bring Monobed into the kitchen as well.

GROWTH GOVERNOR

Maleic hydrazide is a promising new selective herbicide, growth regulant.

SUBURBANITES who find the patch of grass in front of their homes more than they and a lawn mower can cope with, have been hearing of help from an unexpected source: maleic hydrazide (1,2-dihydropyridazine-3,6-dione), a new chemical selective herbicide and plant growth inhibitor developed in the Bethany, Conn., laboratories of Naugatuck Chemical Division of United States Rubber Co. Not only will it make the grass grow more slowly without injury, but it will also eliminate undesirable crab grass.

Although the idea of tossing away the lawnmower appeals to man's natural laziness, much more application research data must be gathered before such emancipation can be seriously anticipated. The material is still only in the small pilot plant stage, and D. L. Schoene, whose organic research division has been responsible for the chemical end of the development, says it must still be considered an experimental material. It is, how-



MALEIC HYDRAZIDE (right): Time stands still.

ever, being field tested extensively this summer, and Naugatuck is prepared to manufacture it in volume when repeated testing sets its limitations and indicates its potential. So novel are its effects upon plants that it is difficult to predict where its first commercial use may develop, whether it will be a volume chemical or a specialty chemical.

Four-Way Action

Since it was first reported about a year ago, tests have been conducted by John W. Zukel of the company's Agricultural Chemical Development Group and H. Douglas Tate, group director, as well as by several hundred other investigators who have received samples. So far, it seems promising for these uses: selective grass herbicide, temporary inhibition of plant growth, preventing formation of undesirable seed or pollen, and preventing sprouting of tubers in storage.

As a selective herbicide, it will kill both Johnson and quack grass, two of the South's most annoying weeds. In addition, it can be used to eliminate crab, witch and nut grass. There is a possibility of its controlling certain weeds in cotton, particularly in the West, and wild onions.

Plants Mark Time

Its most spectacular effect is inhibiting plant growth for a period of time after which normal growth is resumed. Tomatoes have been so regulated without injury, as have strawberries, raspberries, a variety of hedge and lawn grass. Such retardation could be useful in the spring to prevent frost damage, and possibly later, to delay harvesting when there is a surplus of a commodity on the market, or to space out the harvest period.

In experiments, maleic hydrazide has prevented objectionable new green growth on tobacco which has been topped for drying prior to harvesting. Similarly spraying corn prior to tassel formation produced male sterile plants with normal ears. The latter may be very valuable in hybrid corn production, where hand detasseling must be employed to prevent self-fertilization of the corn.

Another potentially big commercial use may be prevention of sprouts on potatoes, onions, carrots, beets and the like in storage. Potatoes, for example, are stored under refrigeration to keep them in a saleable condition for market. Early work indicates that a spray before harvest with maleic hydrazide, or a dip afterwards, may make such precautions unnecessary. Dipping apples to increase keeping qualities is another possibility, and some work is being directed at maintaining dormancy of nursery crops.

Naugatuck has turned over to a toxicological laboratory the determination of the chemical's toxicity. It is already known, however, that it is not very toxic. The samples now being distributed are the diethanolamine salt, although some of the early tests were made with other salts. The effect varies with the salt and its concentration. Whether or not a wetting agent is used, as well as which one, can make a difference too.

The new material seems like a sure bet to attain some commercial uses. Which ones, and how, should be a lot clearer by the end of the summer.

FLUORINEOPHYTE

New company in New Jersey turns out polytrifluorochloroethylene oils, greases, and waxes.

FLUORINE chemistry has gained another recruit. Halocarbon Products Corp. is now making oils, greases and waxes from polymerized trifluorochloroethylene.

It started when Bob Ehrenfeld interrupted his chemical studies at Cornell University to go down to Oak Ridge, during the war, and work with fluorine compounds. He learned a lot there, and he learned more when he went back to Cornell to continue his studies under fluorine expert W. T. Miller (*CI, Oct. 1948, p 586*).

Intrigued by the commercial possibilities of fluorine compounds, he started to formulate plans while continuing with a post-doctorate year at M.I.T. He finished his work there a year ago, and in September, after a well-earned rest, borrowed a laboratory in New York to test a new process he had devised—a process he thought was better than any currently used.

His ideas panned out, and by the first of this year he was ready to go into production of oils, greases and waxes made of trifluorochloroethylene polymer. He gathered enough money to put up a small plant at 2012 88th St., North Bergen, N. J., and by this month he had started marketing his products to chemical plants and laboratories.

No Hydrogen

Key to his process is his ability—by means he's not divulging—to obtain completely saturated and completely halogenated polymers. Ordinary polymerization techniques employing benzoyl peroxide, chloroform, etc., give rise to acid-forming impurities that cause corrosion and decomposition.

BOB EHRENFELD: His ideas panned out.

Ehrenfeld doesn't make the monomer. He buys it from Du Pont, which reportedly makes it by dechlorination with zinc of Freon 113 ($CFCl_2$ $CClF_2$), and polymerize it to various degrees for his basic products.

The lower polymers are oily liquids, and these Ehrenfeld is selling as vacuum pump oils, manometer oils, and inert stuffing-box lubricants. They are also useful as plasticizers for hard trifluorochloroethylene polymers, rendering them susceptible to injection molding and extrusion. Without a plasticizer such polymers can only be compression-molded and the high working temperature (300° C) sometimes causes slight decomposition.

Ehrenfeld is also aiming at another market: hydraulic fluids. These oils are completely nonflamable, not susceptible to hydrolysis, and do not swell rubber.

The more viscous polymers—greases and waxes—are being sold as stopcock grease and sealing cement.

One problem that gave Ehrenfeld trouble was poor viscosity index—a notorious characteristic of these polymers. He solved it, not by adding any other chemicals, but by learning to blend polymers of different molecular weights.

Price on Skids

Another problem—high price—is a lot tougher, but some progress has been made. Ehrenfeld's selling price of $15 per lb. ($17 in small quantities) is lower than those of many competing products, and Ehrenfeld has high hopes of eventually bringing his prices down to the point where he can compete with the silicones.

sonics

As used here, the term *sonics* refers to all sound vibrations, both in the audible and the so-called ultrasonic (inaudible) range above 20,000 cycles per second.

The term *ultrasonics* is required only because of the physiological accident which requires a term to distinguish between the audible and inaudible sound waves.

***Supersonics* refers to something which is moving faster than the speed of sound. It is sometimes incorrectly used interchangeably with ultrasonics.**

BIG NOISE ABOUT SONICS

New high power generators speed chemical reactions, disintegrate solids, collect dusts and mists, and measure wall thickness.

UNTIL recently industrial use of sonics was limited to communication. Today, although many uses are still in the stage where they are more potential than actual, the development and application of generators of high acoustic power have clearly shown that the engineer has still another important processing tool.

As with all new tools, some enthusiasts have jumped off the deep end and, in effect, have termed the development the greatest advance since the discovery of the wheel. Others have pointed to the obvious disadvantages of sonics, such as high cost when compared to other forms of energy, and announced that it will be of little if any value. Results attained to date in gaging applications and in collecting solids or liquids suspended in gases quickly disprove the latter opinion and certainly do not match the impossible promises of the first group. As with all new tools, the answer is somewhere between the two extremes.

Fundamentally, sonic vibrations are nothing but energy served up in a new form. Where this form is particularly suited to certain jobs, its relatively high installation and operating cost is counterbalanced by large savings in processing cost. And indicated savings in cost are the first requirement for use.

Gaging

First commercial application of sonics—feasible because high acoustic power output generators were not required—was in locating flaws in solid materials and as a non-destructive method of measuring wall thickness (*CI, April 1949, p. 578*). This development stems from work done by the General Motors Research Laboratories. In these devices the wall is vibrated locally at high frequencies over a variable range to determine the fundamental natural vibration frequency of the wall. Just as the tone of a pipe organ is a function of the length of the pipes, this natural frequency is a function of the wall thickness of a given material. Thus any variation from this fundamental resonance frequency indicates either one of two things: a flaw, such as a gas or slag occlusion, or a change in wall thickness. Here is truly an answer to the maintenance man's prayer—a relatively simple way to measure wall thickness to spot excessive corrosion or erosion.

Dust and Mist Collection

The recent development and application of high-power-output, siren-type generators by Ultrasonic Corp. have already established sonic vibrations as an important contender in the competitive scramble between the various types of dust and mist collection equipment.

Such equipment is already being used to collect fine particles of sulfur formed during its production from hydrogen sulfide gas; sulfuric acid mist at several production units; oil fog formed in asphalt roofing manufacture; and, in one pilot unit, carbon black. This pilot unit may turn into a full-fledged commercial operation in the very near future. At the recent meeting of the American Institute of Chemical Engineers at Swampscott, Mass., C. A. Stokes, of Godfrey L. Cabot, Inc., which operates the pilot unit, and J. E. Vivian, of Massachusetts Institute of Technology, stated that Ultrasonic Corp's new U-7 siren-type generator makes the construction of commercial plants for carbon black collection economically feasible.

Sonics in Liquids

Until recently the application of sonics to solids or liquids has been limited by the extremely low power output of the available generators. However, the high power output (1250 watts) of the piezoelectric transducers recently introduced by Brush Development Co. (*CI, Dec. 1949, p. 885*) provides the answer to this problem.

In the piezoelectric generator, high-frequency electrical oscillations are transformed into mechanical (sound) vibrations by certain types of crystals, such as quartz, Rochelle salt, and the barium titanate used by Brush.

In the past, applications of this type of generator have been limited because it was necessary to get large individual crystals for a large power output. Such crystals are rare and expensive. Brush, however, does not use single crystals. Multiple crystals of barium titanate are aligned during the formation of the ceramic element. An additional advantage of the barium titanate element is that it can be fabricated into almost any shape so that the sonic waves can be focussed on the spot where they will do the most good.

This development is so new that industry has not had time to assess its value. However, it is expected to find application both in forming and breaking emulsions, sterilization of liquids, homogenization of milk, as a dyeing aid, and for other related uses.

The Brush instrument, however, is not an economical device for the whole sonic spectrum. Its use for large power outputs is limited to the high frequency (100-1000 kilocycles per second) sector.

But there are applications where lower frequencies are desirable for best results. For example, a pilot unit is now operating where the sonic irradiator has replaced the beater in wood pulp processing. Although it is too early to make a true evaluation, both lower power costs and an increased bursting strength of the paper product are indicated. Frequencies in the lower audible range are used.

Another proposed use which would seem to call for a similar but less drastic treatment is the oft-reported use of sonics to shake the dirt free from soiled fabrics. Soap is still required, however, to prevent the redeposition of the dirt.

Two groups, Sonic Research Corp. and another unnamed company, are now developing mechanically-actuated piston-type generators that would appear

to fit the requirements for these uses. Frequencies range from the sub-audible to 50 kilocycles per second.

The above represent only a few of the many systems which have been and are being studied in the laboratory. It would appear that the most promising field for sonics is to speed up the many rate processes which are controlled by diffusion of material at an interface. The rate of diffusion is controlled by the relative velocities at the interface, and the very high local velocities that can be obtained by irradiation with high-frequency, high-intensity sound waves can be used to advantage. For example, the reaction of iron powder with a copper sulfate solution takes approximately 24 hours when using conventional types of agitation. With sonics, it's finished in only a few seconds.

TRUER TO LIFE

New cotton detergency test gives results that correlate with household laundering.

GENERAL Aniline & Film Corp.'s researchers were upset. They knew that their Antara Products division's nonionics—basis for many commercial detergent compounds—did a good job in the laundry when they were incorporated into "built" formulations, but the standard Launder-Ometer test didn't agree.

While the standard test has been used for about 20 years, it has been under attack for 17. General Aniline researchers Herbert Sanders and Joseph Lambert recognized several of its weak points: First, the Launder-Ometer's washing action is rather feeble compared with that of modern household washers; second, the "standard" soil, usually consisting of lampblack and fat, isn't much like the dirt on a shirt cuff or a cotton dress; and lastly, the average clothes-wearer doesn't apply dirt to his clothes from suspension in an organic solvent—he rubs his shirt sleeve across a dusty desk, or she sits (and maybe squirms a bit) on an unwashed bench.

Just Like Home

Sanders and Lambert got hold of four roller towels and marked them I, II, III, and IV. They put them in the washrooms at General Aniline's Easton, Pa., plant and removed all the soap, substituting borax instead. Then they got a regular Maytag washing machine and laundered the towels with detergents I, II, III, and IV, which were, respectively, a built powdered synthetic containing 15% nonionic detergent; a built soap powder; a 15% nonionic solution built with CMC; and a straight 15% nonionic solution. After eight cycles of soiling and laundering, whiteness of the towels (as measured by reflectance with a photometer) ended up in one-two-three-four order.

Then they used the same detergents in the standard Launder-Ometer test. The results—convincing them that the test is unrealistic—rated detergents in four-one-three-two order.

Their next step was to collect ordinary street dirt from six cities: Pittsburgh, Detroit, Cleveland, Buffalo, St. Louis, and Boston. They were all pretty much alike and—most important—carbon black was not a significant component of any of them.

SANDERS AND LAMBERT: Housewives knew better.

They then synthesized a soil that gave the same approximate analysis in terms of water-soluble portion, ether-soluble, ash, carbon, etc. It consisted mainly of humus, clay, silica, and cement, with smaller proportions of salt, gelatin, carbon black, rust, fatty acids, and minor organic compounds.

Synthetic Sitting

Their next problem was to devise a reproducible means of getting the dirt on the cloth in a way that duplicated actual conditions—sitting, squirming, rubbing. They adapted an abrasion meter, using the disc to rub their synthetic soil into cloth samples.

They used a laboratory washer that was built several years ago to duplicate the housewife's machine, and they carried their sample swatches through several cycles, just as a housewife does week after week until the clothes wear out.

Just as researchers hoped, their new method correlated with the actual roller-towel results, and science can thus tell the housewife what she's already learned in her own basement.

Sanders and Lambert are plumping for their new test, believe that it will evaluate new laboratory products more accurately than the venerable but undependable method used generally today.

BONUS WITH OXYGEN

Tonnage oxygen increases capacity, cuts coke requirements in producing synthesis gas from coke.

MANY a pencil has been sharpened by process engineers in calculating just what they might expect from cheap tonnage oxygen (*CI, p. 565, April 1948*). The payoff, however, is what you get in actual plant operation.

Recently,* J. W. Blatchford, Superintendent of the Water Gas Div. of the Belle (W. Va.) Works of E. I. du Pont de Nemours & Co., lifted the curtain and provided a glimpse of its potential value in producing synthesis gas (carbon monoxide and hydrogen). Time-honored production method is blowing air and steam alternately through coke. Belle engineers substituted a mixture of oxygen and steam, came up with some interesting results which—although Blatchford didn't say so directly—seem to please Du Pont.

Simplification

Converting the standard UGI mechanical water gas sets at the Belle Works meant a decided simplification both in operation—operation was continuous rather than cyclic—and in equipment. The combustion chamber was dismantled and the generators connected directly to the waste heat boilers. Air valves and piping and automatic cycle controller were removed. Finally a connection for mixing oxygen and steam was added. The new and simplified arrangement was essentially that of an updraft gas producer.

Oxygen Supply

But the simplified setup will work only with oxygen. Accordingly Linde Air Products Co. was engaged to design and build a 360-ton-a-day oxygen (95% O_2) plant. It was placed in operation in September 1949.

Centrifugal blowers with cast-iron shells and stainless-steel impellers and shafts push oxygen into the base of the generator and upwards through the coke bed. Coke is supported by a solid rotating ash pan. Oxygen enters through a central tuyere mounted on the ash pan, rotation of which pushes the ash from the generator into ash hoppers.

Run-of-oven by-product coke from a mixture of high volatile West Virginia coals was used. Average ash content was 10.5% and the ash fusion temperature was 2,760° F. During the

* Process Industries Div. of A.S.M.E. and Pittsburgh Mechanical Engineering Conference, April 25; American Gas Assn., New York, N. Y., May 23.

J. W. BLATCHFORD: A peek behind the curtain.

period of operation, the ash fusion temperature has fluctuated over 50% because inferior quality coke had to be used when other supplies were not available. No operational difficulty was experienced.

The Product

The analysis given by Blatchford for the synthesis gas produced with oxygen differs quite markedly from that of water gas:

	Blue Gas	*With Oxygen*
	(Expressed as volume %)	
CO_2	4.6	16.9
O_2	0.4	0.1
CO	39.8	46.6
H_2	50.0	34.0
CH_4	2.2	0.2
N_2	3.1	2.2

Hydrogen content of the oxygen-produced gas is much lower than that of water gas, and even water gas must be enriched with hydrogen if it is to be used for either methanol or ammonia production. Thus, although Blatchford does not say so, the oxygen gasification product must be passed through a gas shift unit to increase hydrogen content by reacting a portion of the carbon monoxide with steam.

It is also obvious that a much greater quantity of carbon dioxide must be removed by Du Pont's ingenious mountain system for scrubbing out the carbon dioxide. In this system two pipes are laid up the side of the mountain behind the plant and water circulated through each in series. At the bottom of the mountain the pressure approaches some 50 atmospheres and here the water scrubs out the carbon dioxide from the synthesis gas. Carbon dioxide is released from solution at the top of the mountain when pressure is decreased. This carbon dioxide is collected and used, presumably to provide feed to Du Pont's urea plant.

The reduced coke requirements and increase in capacity of a given generator when added to decreased down time for maintenance would indicate a sizable increase in Du Pont's synthesis gas generating capacity.

ARCTIC STRETCH

Tests at Bureau of Standards show silicone rubber retains elasticity at 148 below zero.

NAPOLEON was licked by the Russian winter, and so was Hitler, for a different reason: His trucks bogged down as the cold gripped their tires and froze them solid. Military men have been worrying about the next war, a likely theater of which is the polar region—and compared to the winters there, Moscow is a balmy Florida resort.

For that reason the Office of Naval Research and the Quartermaster Corps jointly sponsored a project at the National Bureau of Standards to look into the low-temperature properties of silicone rubbers. Paradoxically, these rubbers were developed especially for high-temperature applications. Findings in a nutshell: They're potentially better for arctic use than any synthetic or natural rubber studied thus far.

Second-Order Transition

Tires, belting, or other articles of ordinary rubber lose their elasticity around —60° F., making it tough to operate motor vehicles and machinery in the arctic or airplanes at great height. To learn more about the possibilities of using the silicones for such low-temperature applications, the Bureau determined the lowest temperature at which they retain their characteristic elasticity.

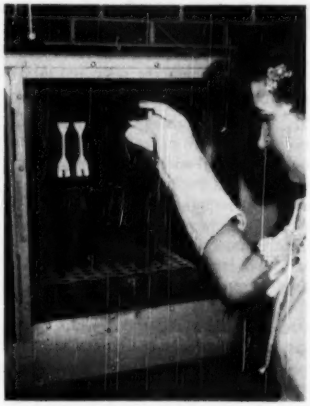
This lower limit was determined by locating the second-order transition temperature—that at which a marked change in the slope of the length-temperature curve occurs. Such a change is observed in all rubbers and plastics and can be recognized as a discontinuity in the derivatives of the curves obtained when volume, heat content, index of refraction, compressibility, dielectric constant, and other quantities are plotted against temperature.

Behaves Like Solid

Below this temperature the type of molecular motion responsible for the useful properties of a rubber ceases, and the material behaves essentially as an ordinary solid.

In practice a rubber becomes useless for applications requiring long-range elasticity at temperatures somewhat higher than the transition temperature. Thus, in natural rubber the second-order transition temperature is at —94° F but the rubber is seldom useful below about —67° F.

The silicone rubbers studied were all of commercial origin. All except two, which were pure-gum silicones, contained fillers and vulcanizing agents, and several were especially designed for low-temperature applications. Small differences in transition temperature among any of these samples showed that fillers and vulcanizing agents have little effect. Measurements on two commercial silicone rubbers not designed for low temperatures were in substantial agreement with those for the low-temperature silicones.



SILICONE RUBBER TEST: They don't mind the cold.

One Was Unique

One, Dow-Corning's low-temperature Silastic X-6073, was outstanding in that its volume-temperature curve was essentially linear from 212°F until the second-order transition temperature of approximately —189° F was reached. All other silicone rubbers studied likewise exhibited a second-order transition at about the same temperature—the lowest one at which such a transition has been observed in a polymeric material. However, the other silicones, on being cooled from room temperature, also went through a first-order transition at temperatures varying from —85° F to —103° F.

The first-order transition produces some stiffening and has apparently pre-

vented the successful use of silicone rubbers below this temperature. However, the one variety which exhibited no first-order transition should have good possibilities for use at temperatures as low as —148° F.

STYRENE-LESS GR-S

Polybutadiene rubber may offer a way around critical benzene-styrene shortage.

OUT of the Borger, Texas, copolymer plant of U. S. Rubber Co. last month came some 450,000 lb. of a new synthetic rubber made entirely of butadiene. It contained none of the styrene that has been incorporated to the extent of about 25% in American synthetic rubber since the industry was created in 1941.

The material from this initial run at Borger, the first to be made outside a pilot plant anywhere, will be used for test work and to make experimental tires. One objective is to determine whether "PB" rubber, as it is called, can help reduce the synthetic industry's requirement for styrene. For some months now styrene has been short as a result of a scarcity of the benzene from which it is made. Petroleum-derived butadiene, however, is in ample present and potential supply.

Toughie Softened

All of the major rubber companies have worked at one time or another on polybutadiene rubbers. The process used at the Borger plant is one developed by the Phillips Petroleum Co. from investigations financed by the Office of Rubber Reserve.

A principal difficulty with the PB rubbers made experimentally in the past was that they were extremely tough and difficult to work. The Phillips process is said to overcome this. It makes a stock of exceptionally low Mooney viscosity, which means a relatively soft material. Carbon black is added in the master batch before polymerization, which also cuts milling requirements.

Basically, except for the elimination of styrene, the Phillips recipe is the same as that now used for cold rubber. It involves a hydroperoxide catalyst, although much smaller quantities are required because the polymerization is carried out at 86° F., which is about midway between high- and low-temperature GR-S. Conversion is about 60%, or the same as for ordinary GR-S. The 86° polymerization temperature is high enough to avoid undesirable crystallization, yet low enough to get some of the desirable properties of cold rubber.

In fact, blending with cold rubber for tire tread stocks appears to be one of the more promising possibilities for polybutadiene rubber. One of the chief objections to cold rubber has been its tough processing. Blended with PB, it becomes much more manageable.

Future Hinges on Tests

If Rubber Reserve decides to go into regular production of PB rubber, it can do it without making any significant changes in present copolymer plants.

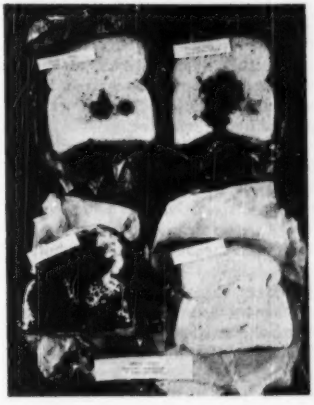
But neither it nor Phillips is making any predictions. Despite promising properties and an inherent material cost advantage (there is now a 7-cent price differential between butadiene and styrene) the real answer to PB's future lies in the factory and road tests that will be made this summer and fall.

MOLD MASTERED

Dow Chemical carrying out field tests on dehydroacetic acid, thinks it may be ideal mold inhibitor for foods.

NOT by any stretch of the imagination can dehydroacetic acid be called a new chemical. It was discovered among the pyrolysis products of acetoacetic ester by a German chemist in 1866.

But just recently Dow's chemists got a bright idea. A review published in 1946 commented on the fact that many antibiotics—clavacin, fumigacin, penicillic acid and kojic acid, among them—contained alpha, beta-unsaturated ketone groupings. So Dow's researchers studied a lot of compounds containing that particular arrangement of atoms, including that 84-year-oldster, dehydroacetic acid.



BREAD WITH DHA (lower right): An 84-year-oldster revived.

It cleared the first hurdle by showing definite inhibition of bacteria yeasts, and fungi. A second hurdle was cleared by virtue of the compound's being colorless, odorless, and tasteless—requisites for a material to be used in foods or cosmetics.

A more important hurdle was safety: and feeding tests on guinea pigs, rats, dogs, monkeys, and finally humans showed that use of the material presented no health hazard.

pH No Problem

Another important advantage came to light in the course of laboratory investigations. Many organic acids work fine in neutral or slightly acid environments, but lose most of their activity in a high pH. Propionic acid, for example, stops growth of *Aerobacter aerogenes*, a common food contaminant, at a concentration of ¼%; but it takes over 5% of sodium propionate to do the same job. The corresponding percentages for dehydroacetic acid and its sodium salt are 0.3 and 0.6.

Tests on bread, prunes, and other fruits and vegetables have proved the efficacy of the compounds, which Dow calls DHA (the acid) and DHA-S (the sodium salt).

For bread, the compound was incorporated in the wax used on the wrapper. Concentrations of 1 to 3% DHA in the wax were usually found sufficient. Such wraps are also effective on other food products such as butter and cheese.

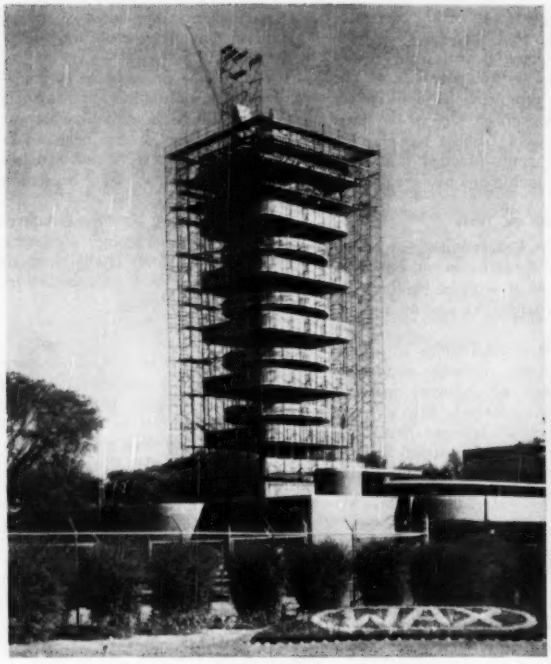
Prunes were treated by dipping in DHA solutions varying in concentration from 0.05 to 0.2%, which proved sufficient to retard mold growth.

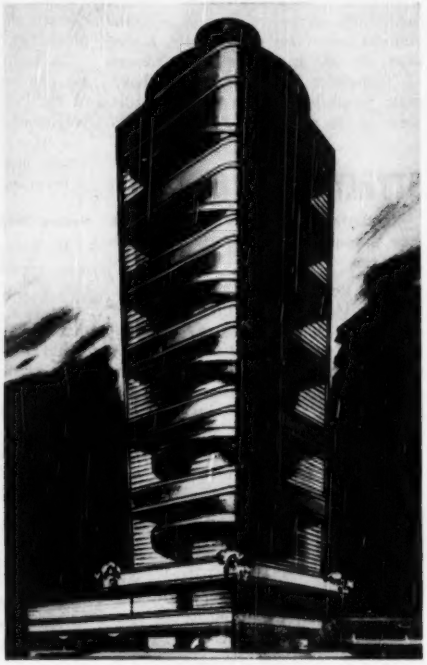
Price and Acceptance

The two final hurdles—and the toughest ones—are price and acceptance, and the latter depends pretty heavily on the former.

Dehydroacetic acid is usually made by a self-condensation of acetoacetic ester in the presence of sodium bicarbonate. The raw material is quoted nominally at 46¢ a pound, and considering the loss in weight upon reaction, assuming this process is used, the raw material cost (excluding processing) is over 70¢ a pound.

But only small quantities are needed compared with many other commonly used antimycotics, so cost may not be a decisive factor. Dow apparently doesn't think so, for DHA is in limited commercial production now, and larger production is expected in the near future.





JOHNSON'S RESEARCH TOWER: An architect and a chemist talked it over.

NEW HIGH IN WAX RESEARCH

Glass-enclosed building of cantilevered floors supported by central core makes functional research laboratory.

WHEN J. V. Steinle sat down with Frank Lloyd Wright to explain his requirements for a wax research laboratory, the renowned wax authority of S. C. Johnson & Sons, Inc. and the famed architect came up with plans for the 15-story research and development tower now under construction at the company's Racine, Wis., plant. Researchers moving into this house of glass next fall will find it not only an architectural masterpiece, but also a completely functional building for research in wax or any other branch of chemistry.

Perhaps of most interest architecturally is its cantilever construction that gives the floor support only from a central core. Floors are of heavily reinforced concrete, and walls are formed by a double thickness of glass —with tubing on the outside and plate glass inside.

The floors are 40 feet square at alternating levels with circular mezzanine levels 38 feet in diameter. The glass walls connect the alternate square floors.

It is the center, reinforced-concrete stem that gives the tower its true functionalism. All services function within the central core, which contains stairway, elevator, dumbwaiter, electricity, heat, air conditioning as well as the purely chemical services. The latter lead from the core through the floors to the outer edge, then circle inside the building, with outlets in the laboratories where required. Hoods and other work benches are grouped around the central core.

Since everything comes through the central shaft, and since this is the only means of movement between floors, no work space on the floors is lost. There are no aisles or other waste area to reduce the building's efficiency.

In assigning space to different departments, floors are grouped in units —a square floor and a round mezzanine being considered one pair of floors. Excluding the top floor where the elevator machinery is located, there are six such units above the second floor.

Top two pairs are for basic research. Steinle, who is director of the research and development division, feels that it is better for this department to be the least accessible, to leave the research men literally undisturbed in their tower. Instead of following the trend of locating them out in the country, he has stuck them up in the air.

Next three pairs of floors, working down from the top, will house the development departments. Two pairs are for wax and one for paint and varnish.

Control laboratories logically are on the lowest pair of floors above the second floor. Here the chemists who are in daily contact with the production division are within easy reach of the manufacturing units.

The division's extensive technical library will be on the second floor. This might well be called the "first" floor since the ground level of the tower around the core is left open. Plantings and pools will spread out around the base.

Administrative offices will be located in a glass-enclosed bridge leading from the second floor. Here also will be located a conference room.

Two more units of the building will house the remaining departments of the research and development division. The technical service department connects with the tower second floor by

way of the glass-enclosed bridge. Being a link between the research and development men and the sales and advertising forces, it is located within easy reach of both.

In the same building with technical service will be Johnson's "experimental house," containing a living room, dining room, kitchen and utility room. Here new and improved wax products for home use will be tried out under practical conditions.

Across the court from the tower and connected to it by direct tunnel is the second separate unit—the experimental engineering department. This has a huge, two-story pilot plant which is already in operation. Personnel of this department have their offices in a glass-enclosed mezzanine overlooking the pilot plant. In the basement are six temperature- and humidity-controlled rooms. As a fire safeguard, all furniture and equipment in the laboratories and the laboratory work areas are specially designed of metal or stone.

CLEANER CLEANING

Synthetic detergent makers develop special products to increase share of dry cleaning industry's purchases.

THE NATION'S bill for dry cleaning this year will exceed a billion dollars. Out of this income, the dry cleaning industry may spend as much as $8 million for soaps and synthetic detergents, major share of which will go to sellers of the former. Synthetic manufacturers, however, armed with new products and aggressive selling techniques, are out to get a bigger piece of this small—when the general industrial potential of synthetic detergents is considered—but still lucrative market.

Attractive as it may seem at first glance, selling in this field is no cinch. A large proportion of sales must be made to distributors or jobbers who are not particularly interested in promoting better products to cleaning plants. Adding anything to a solvent can be tricky, and the large number of cleaners—25,000—most of whom are small fellows with individual problems and little technical knowledge, makes the demand for service seem out of proportion to the sales volume involved.

Can't Be Too Bad

Yet despite these obstacles, Alrose Chemical Co. is putting its basic 1950 sales effort for new products on its Alrolenes, and the Du Pont Co. is continuing promotion of its Ovalclene, introduced about a year and a half ago. Antara Products, General Aniline & Film Corp., is in the process of developing new products for this field and, in addition to those already in its line, is offering three development numbers for test. E. F. Drew's Drisyn, the product of 6 years' development, is widely advertised and used in the field, and Naccolene F, an alkyl aryl sulfonate National Aniline Division, Allied Chemical & Dye Corp., brought out in the early '30's, still finds its major use in industries—including dry

DRY CLEANING DETERGENTS: Fewer spots, more dollars.

cleaning—where cleaning action of solvents can be enhanced profitably. Armour and Co.'s Liquid Driclene is another established product.

Solvents to which these are added are petroleum types, principally Stoddard Solvent and synthetics such as trichlorethylene, perchlorethylene and carbon tetrachloride. These are used either alone or in combination with soap or synthetic detergents. Solvent alone will remove greasy soil, but it does it better with soap of some kind, and it is inefficient on water-soluble stains like foodstuffs, drinks and perspiration unless a soap formulation (employing water) is added to it.

Synthetic dry cleaning detergents loosen and remove soil as well as or better than the old type of oleate paste soap in most cases, and do not leave an objectionable odor. (An extensive testing program at The Pennsylvania State College, however, indicates that many synthetic dry cleaning detergents on the market are inferior and some have practically no detergency.) Other properties an ideal detergent must have and which synthetic manufacturers claim for their products: speed up washing cycle, save time on spotting and reduce wet cleaning to minimum; aid in restoring garments and facilitate pressing; help blend moisture and solvent; be concentrated and relatively inexpensive to use; cause no damage to fabric or corrosion to equipment; not contribute to filter pressure; be removed from solvent by active filter aid; cause no foaming in the still; and contain no low-boiling flammable constituents that might contaminate recovered solvent.

All Types

Concepts of compatibility that hold for detergents in water are not applicable here, and all types of detergents are used. The Alrolenes are a mixture of cationic and anionic detergents; Ovalclene contains a detergent base, supplementary wetting agent, blending agent, perchlorethylene as solvent, and a small amount of added water; Antara's products are alkyl aryl polyoxyethylene glycol types; Liquid Driclene is also a non-ionic.

Du Pont's, Drew's and Armour's products work in both synthetic and petroleum solvents. Alrose, on the other hand, recommends Alrolene 65 for synthetic solvents and Alrolene 70 for petroleum solvents. Antara likewise has two types: for chlorinated hydrocarbons, Antarox A-200, A-201, and A-400; for Stoddard Solvent, Antarox B-100 and A-401, commercially available for trial, and developmental agents 377 BK, 340 R and 363 R, pilot plant amounts of which are offered for testing.

While the character of the industry may make introduction of a new product difficult, cleaners will evaluate any material that promises savings in labor and time. Synthetics, with their great penetrating, emulsifying and suspending power, seem to be just what the cleaner would order since they remove dirt so well that spotting is reduced, and where it is still necessary, make it easier; and capacity is increased through shorter cycles and fewer reruns. Actual material cost is insignificant (Ovalclene, for example, costs only about 74 cents per hundred pounds of garments cleaned).

Both Du Pont and Alrose regularly distribute publications to the dry cleaning industry in which they present technical information and discuss cleaning problems as well as tell the story of their own products. Such efforts, combined with nationwide availability of technical service representatives, mean fewer spots ahead for the cleaner and more dollars for the detergent maker.

Nursing new chemicals from experimental samples to repeat orders takes time, work, and a plan.

A Check List Of Steps In INTRODUCING A NEW PRODUCT	
✓	1. Determine properties.
✓	2. Determine fields of application.
✓	3. Make up data sheet.
✓	4. Prepare for development service.
✓	5. Arrange continuous supply of reproducible samples.
✓	6. Make up contact list and open contacts.
✓	7. Follow up contacts.
✓	8. Exchange information, offering new and better data.
✓	9. Offer larger samples, better material (in more useful form).
✓	10. Obtain small pilot orders.
✓	11. Study commercial requirements to reach market.
✓	12. Practical sales service.

FROM SAMPLES TO SALES

by M. H. BAKER, Research Department
General Mills, Inc., Minneapolis, Minn.

INTRODUCING a new chemical product is a highly specialized activity. It requires efficient organization, taut coordination of many different departments of a company, and demands that scientific research, market research, technical service and sales organizations be harnessed for unified, cooperative effort.

The functional heart of any efficient program for introducing a new chemical is a commercial development department—or its equivalent—organized to draw upon the experience and knowledge of other departments, to gather information from many sources, and to guide the new product to ultimate commercial production and use. With an applied research program as a strong right arm of support, the commercial chemical development department assumes responsibility for guiding a new product from test tube to industrial production.

Because its functions are varied and exacting, such a department not only must be well organized but must be manned by qualified personnel. A typical commercial chemical development organization consists of:

1. A director or coordinator who has executive status, generally on the same level as the director of chemical research, the sales manager or director of market research.

2. Section heads who are familiar with specific industries and applications and who have wide knowledge of industrial chemical processes, materials and equipment.

3. Applied research personnel, guided by a section leader who is familiar with process chemistry and product, formulation. (This group, of course, seeks applications for the new product, attempts to modify the product to a form most acceptable to industry, and prepares derivatives. Frequently the applied research organization is part of the technical service department or the research department; it is then administered jointly by the commercial chemical development department and the other department concerned.)

The commercial development process begins with a raw product that frequently is a new, untried and unknown material. Following standard procedures, the product is moved forward toward economic and technological acceptance. Although hit-and-miss procedures were once typical of this process, the pressure of competition, coupled with expanding knowledge of product development, has forced it to become well-planned and streamlined. Following is a typical checklist of the major steps involved:

1. Determine properties of the new product. It is, of course, impossible to determine potential applications of a new material without a knowledge of its major physical and chemical properties. Similarly, it is impossible to compare it with other products already commercially available without a reasonably accurate idea of its performance characteristics. Usually, scientific research and applied research together must supply the information for this step.

2. On the basis of these properties, determine where the material is most likely to be useful. To insure acceptance of a new product, it is essential to study the major potential applications in the laboratory and to assemble practical data relating to these applications. Facilities for handling technical and economic in-

quiries about the material must be set up.

3. Prepare a technical data sheet. Such a sheet should describe the new product, its indicated chemical reactions, and its possible applications in clear technical and economic terms. Other essential information includes an indication of potential sales price, limits of availability at the time the sheet is issued, and any and all other pertinent facts that will assist the prospective evaluator to begin his work.

4. Set up for internal service-development work. Since samples placed for evaluation invariably bring a flood of technical questions, many of them unforeseen, it is essential to have facilities to answer those questions rapidly and accurately. This means, of course, that commercial development personnel must be in close touch with scientific and applied research personnel and with market researchers who have knowledge of where the major future markets for the product may lie.

5. Provide for samples for field evaluation. A readily reproduced uniform product, available from a dependable source such as a pilot plant or a process engineering laboratory, is essential to a successful field evaluation program. Also, production facilities must be flexible enough to handle the increasing requirements of at least ten customer organizations during the course of the development program. Beginning with one pound as an initial sample, the requirements of a single firm may increase to five pounds and then possibly to 50 or 100 pounds within a relatively short time. If the material is not available when required a prospective user may lose interest and drop his investigation.

6. Prepare a list of from five to ten prospective users in at least three different fields of possible application. Commercial chemical development personnel usually compile these lists on the basis of their knowledge of men and firms in the fields of application and through the use of industrial directories. Usually, a personal visit to the properly qualified person in each prospective user's organization will help pave the way for the product's evaluation. As he approaches each of the selected companies, the development specialist must be prepared to supply as much specific data as possible about his new product and how to use or formulate it. He must be in a position to assure a continued source of adequate supply.

As increasing supplies of sample material become available, the commercial chemical development department may find it advantageous to publicize the product in trade and scientific publications. This will broaden interest in the product and step up requests for samples. Generally it will be found desirable to send samples at this stage only after a data sheet has been forwarded and a return reply indicates a serious desire to work with the new material.

7. Follow closely the work of possible users. It is obviously important to make sure that samples are actually being evaluated, to answer any technical questions raised by the evaluation, to syphon off and answer questions which may need additional laboratory development, and to obtain information which the introducing company's own chemical laboratory is not in a position to develop by itself.

Personal follow-up calls should be made by a commercial development department representative whenever possible shortly after evaluation begins. When it is impossible to make a personal call, follow-up letters of as personal a type as possible should be sent directly to the person or persons evaluating the product to keep their interest alive and the evaluation project active.

8. Exchange experiences with those evaluating the new product. As a development program advances, new information flows from the developing company's internal applied research organization as well as from prospective users who are evaluating the material. This information should be passed on to other prospective users either by personal letter, product bulletin or by amendments and additions to data sheets. Frequently, experience shows that the original form in which samples were offered is not necessarily the most patentable form or that a modification or derivative would be of more direct interest to certain users or industries.

9. Offer additional, larger and better samples. As mentioned previously, successful evaluations require increasing quantities for use in large scale pilot plant runs and plant tests. In addition, new applications which were not considered at the beginning of the program are frequently developed and require subsidiary evaluation programs in industries or applications not previously considered.

10. Obtain pilot orders. Whenever possible, it is advantageous to have commercial chemical development department personnel attend pilot plant runs made with the new product in the user's plant in order to assist in the trial, to help it succeed, and to gain first-hand experience with the prospective customer's operation.

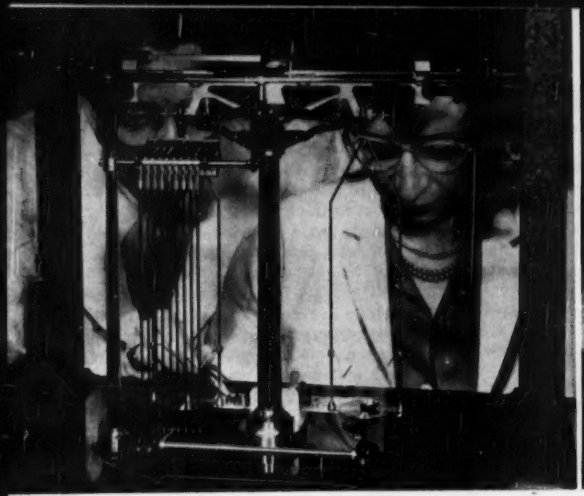
If the product wins its way into several successful applications in more than one field or industry, it obviously is ready for consideration as a commercial product. Here, re-evaluation of a potential market in light of the industries and applications in which the product is fitted is usually necessary. At the same time, the program of obtaining trial orders is expanded to the extent permitted by pilot plant production capacity, and additional plants in the fields of application where the product seems successful are contacted and sold. Fields bordering on those in which the product has been used successfully are also contacted.

11. Begin commercial marketing studies. At this stage, it is well to determine the type of sales effort, industries to be covered, advertising media, sales presentations to be used, packaging techniques, product description to be used on labels, product name, and similar factors. When the commercial chemical development department has this information well in advance of commercial production, it can submit the material to the commercial sales department efficiently and smoothly as soon as the product is ready for the market.

12. Begin commercial sales. At this point the commercial chemical development department serves as a technical sales organization, guiding the activities of the commercial sales department. It passes on "know-how," introduces sales personnel to the people that have been working with the product, and generally catalyzes the entire transition from commercial development to dollar-and-cents sales.

There are many types of new chemical products which might be taken through the process outlined above. Although each product usually will undergo the entire procedure, emphasis and rate of activity will differ and will depend on the type of product, as well as its possible place in the developing company's line of commodities.

The foregoing article is based on a paper presented by the author before the Minneapolis section of the American Institute of Chemical Engineers last spring.



MICROBALANCE is set on a vibration-free mounting. High relative humidity and alpha radiation prevent static electricity errors.

EXPERT technique required for microanalysis is possessed by relatively few, but their work cuts research laboratory time and costs.

SMALL SIZE of micro flasks, crucibles, etc., is shown by comparison with cigarette. Proportionately small sample sizes make many analyses possible on a small amount of material.

Microlab Cuts Research Costs

by HOWARD C. E. JOHNSON, Managing Editor

TIME IS MONEY, ESPECIALLY IN A RESEARCH laboratory. A microanalytical laboratory saves researchers' time, costs no more initially than a standard set-up.

THERE'S nothing new about microanalytical laboratories but, surprisingly, they're still regarded as untried innovations by a great many industrial research organizations. The successful experience of Hercules Powder Co., which has had a microanalytical section at its Experiment Station near Wilmington, Del., for fifteen years, should convince the most conservative stand-patters that there's gold in the idea.

The place of the microanalytical group within the organization is best understood by reference to the accompanying chart. The Experiment Station is the central research organization of the company and thus its work is varied, dealing with both fundamental and applied research on cellulose derivatives, terpenes and rosin chemicals, and other broad fields in which Hercules is interested.

The Analytical Division is set up to serve the research groups, and it is divided into four subdivisions: Standardized Analyses, which carries out thousands of determinations a month; Methods Development, which is engaged in analytical research and development of new analytical methods; Physical Chemical Measurements, which determines such data as viscosity, reaction rates, vapor pressure, etc.; and Laboratory Standardization, which sets up standardized procedures for analysis and provides materials and products specifications to plant laboratories.

The micro group is one of several groups in the Standardized Analysis subdivision; the others are organic, inorganic, polarographic, resins, solvents, etc.

Sharing the job of standardized analysis with these other groups, the micro group is neither more nor less important than the others. Hercules holds no brief for micro technique *per se*; it considers it simply as another tool which, used intelligently, can do certain jobs more efficiently.

An obvious advantage is the smallness of the samples required. Samples are often the end-products of tedious syntheses involving several steps and low yields. Micro methods can yield data which otherwise could not be obtained without repeating the synthesis on a larger scale. That takes time—and a research man's time is an expensive item in laboratory operation.

COST OF MICRO

Microanalysis isn't necessary if a sample large enough for ordinary micro methods is economically available, and under such circumstances there's usually no point in using the more meticulous micro techniques. Often, however, it's cheaper and more efficient to do research on the smallest practicable scale—a saving that couldn't be taken advantage of in the absence of a microanalytical laboratory.

Many of these savings would be off-

set if microanalysis cost more than macroanalysis, but Hercules' research management doesn't believe that it's generally costlier than the more orthodox analysis.

Some items are more costly: e.g., micro and semi-micro balances and their vibration-proof mountings. Much of the other equipment, however, such as platinum boats and crucibles, are cheaper simply because they're smaller. When microanalytical equipment is standardized, as is now being done by the American Chemical Society's Analytical Division, cost will be even less.

Micro equipment takes up less bench space, thus allowing expansion of research facilities without new construction.

Too, many analytical operations can be performed more quickly. Small samples dissolve faster; heating, calcining, combustion, and solvent evaporation all take less time.

HERCULES' FACILITIES

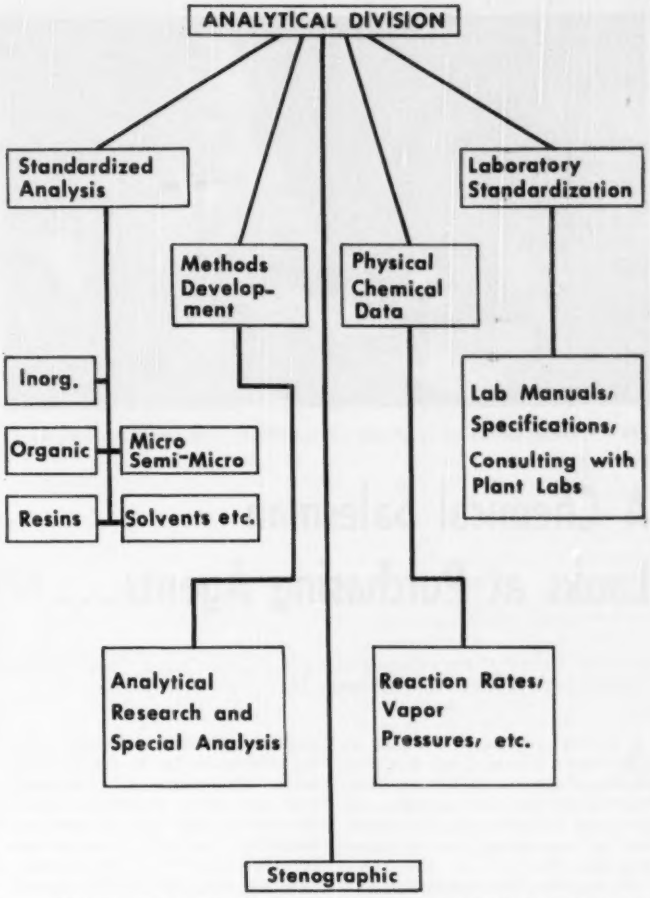
Five full-time chemists and technicians staff the micro section which occupies two laboratory rooms. Air is filtered free of dust and kept at constant 70° F. temperature and 50% relative humidity, thus eliminating errors arising from variations in these conditions. The relatively high humidity prevents accumulation of static charges —a source of error in weighings.

Two semi-micro and two micro balances provide accuracy (in grams) to the fifth and sixth decimal places, respectively. Each micro balance is set on a glass plate which rests on a 4-inch bed of sand; the sand is separated from a 700-lb. concrete block by a lead sheet, and another sheet of lead separates the block from the floor. The balance table is divorced from this vibration-proof mounting. An alpha-ray emitter near the balance case ionizes the surrounding air as an additional precaution against the accumulation of static charges.

Molecular weights are determined in set-ups that measure the freezing-point depression of camphor, benzene, or water; or the boiling-point elevation of acetone, ethylene dichloride, ethyl acetate, or other suitable solvents.

Direct determination of nitrogen (Dumas), sulfur, halogens, sulfate, and oxygen can be made on micro quantities. The latter, incidentally, is a newly-developed analysis wherein the oxygen in a sample reacts with carbon at 1120° C. to give carbon monoxide quantitatively. The reducing action of CO is the basis of the final measurement.

Semi-micro quantities of samples are used for carbon and hydrogen analysis hydrogenation, and sodium fusion. The latter technique is a useful "screening" analysis, since it is quantitative



ORGANIZATION CHART shows position of micro section within the division.

enough to give a rough idea of the nitrogen, sulfur, or halogen content. If the results are not those anticipated (showing that the expected compound was not obtained) a more refined analysis may be unnecessary.

Various operations are carried out in small glassware, ultramicroburets, and a microcentrifuge.

LARGER FIELD IN PROSPECT

Micromanipulation of chemical compounds is new enough so that all of its possibilities still have not been explored. At first standard analyses were simply scaled down in size, but now unique microanalytical methods have been evolved.

Microanalysis has its limitations. It is often unsuitable for determining trace quantities of constituents, and it is unsuitable for materials that aren't homogeneous. If samples are gummy, fibrous, or otherwise difficult to render uniform, trying to analyze them by micro methods would be like analyzing one pebble to determine the properties of a load of gravel.

Until recently micro methods were not taught in colleges and universities. Veto Aluise, head of Hercules' micro section, was trained as a chemical engineer; one of his co-workers is a graduate bacteriologist. But now several schools teach micro techniques, and as they become more familiar their use will widen. Some chemists advocate their use in research as well as in standardized analysis, and Hercules predicts that they will eventually be used in control analyses of certain raw materials and products.

But micro vs. macro isn't an "either . . . or" proposition. It is pointless to discuss the cost of a micro lab vs. an ordinary analytical lab, for they are not interchangeable. A micro laboratory is an adjunct—and for certain jobs, thinks Hercules, a mighty useful and profitable one.

This is a familiar position for Cy Merrell—sitting across the desk from a purchasing agent.

A Chemical Salesman Looks at Purchasing Agents . . .

by C. W. MERRELL, Ass't General Manager of Sales, Organic Chemicals Div. Monsanto Chemical Company, St. Louis, Mo.

AFTER many years of calling on buyers, I have found that there are several representative types. When you run into these various types, you can almost tell at the outset how profitably or unprofitably you will spend your sales time.

Perhaps the most aggravating to a busy salesman is the *Cluttered Charlie* type. You can usually tell the Cluttered Charlies by the mess on their desks. They seldom want to know anything about your products; their attitude is one of frustration.

To such an individual, it is almost pointless to tell your sales story. He is too harried to remember it, and if you leave some product literature with him, you can be sure it will soon be lost in the clutter on the desk. I make so bold as to say a Cluttered Charlie is even more of a liability to his company than he is an aggravation to the salesmen he must deal with.

The next highly individual type I can call the *Hang-Dog Harry*. These are the fellows who don't look at you, who seem to feel that if they look you in the eye they may be hypnotized. So they keep their eyes on the northwest corner of the ceiling, or they stare out of the window.

Where does avoiding the eye cost this man money? A salesman naturally is looking for the areas in which the buyer's immediate interests lie, what products he is most likely to be needing information on in the next two weeks. How much more profitably could both salesman and buyer spend the time of their visit if the buyer would look the salesman in the eye and say straight from the shoulder: "The only thing I'm remotely interested in today is this. Tell me all you know about it and how much it costs."

That would be a good rule to follow for the *Poker-Face Petes*, too, who are a special species of the Hang-Dog Harrys. These fellows look you right in the eye, but they never let on.

Now that I've taken my pot shots at the more or less rare or special breeds whose numbers are few but whose time-wasting talents are great, let me get on to the larger number of purchasing agents who fall into categories we can call the better-bred species. Let's call this group the *Inquiring Minds*.

The purchasing agent with the inquiring mind is a real asset to his company, particularly if he confines his investigations to the products that are of use to his company. These men inform themselves most fully of every detail that concerns the product, its application, its price, and the delivery service. They are nimble in tracking down quantity discounts, packaging options, freight classifications. They secure like data on your competitors' products.

The purchasing agent with an inquiring mind puts a salesman on his toes. With this type of individual, you can quickly come to the point of what advantages your product has over others. Since he is familiar with the whole picture, he is in a good position to give undivided attention to the important points of difference.

Unfortunately, it frequently happens that such a man is an information gatherer for someone higher in the organization. This is a disadvantage to both the salesman and the company. Since it is virtually impossible to transfer the entire contents of one mind to another, the buying decision may be made by a higher-up who has obtained only a portion of the picture from the excellent Philo Vance who is interrogating the salesmen.

We finally come to the champion of purchasing agents. I think I voice all salesmen's opinion that the best type of purchasing agent, the one who is in the best position to serve his company, is the purchasing agent with the orderly, inquiring mind who is backed up by full authority to act. Such an individual is a joy to a salesman. He comes straight to the point and he is definitely interested in the products that relate to his own operations.

There are many such purchasing agents. They possess a truly executive-type personality. They wear their enormous authority easily. They are distinguishable by their lack of affectation. The stamp of ability to make important decisions rests visibly upon them.

With such purchasing agents, a salesman feels a close kinship. These are men who have the interest and the ability to evaluate the sometimes fine differences that exist in competitive products. Sulfuric acid, for example, supplied by reputable companies is all fairly uniform, both as to price and quality. But Company A may be able to give a better credit extension than Company B. On the other hand, Company B's acid might be a few parts per million lower in iron or arsenic. The distinctions are fine ones and it takes an informed and alert mind to appreciate and evaluate them. Sometimes these small differences are the thing a chemical salesman has to sell.

The kinship between a salesman and a first-rate purchasing agent goes even deeper. The purchasing agent himself is a salesman. It is frequently necessary for him to sell his own management or his own production department on accepting his judgment concerning a particular material or piece of equipment. There are few men in purchasing whose decision is accepted by management or production without factual substantiation. As a consequence

the purchasing agent must sell his decisions to still other executives, and he obtains the material for his own sales effort by retelling the sales facts that the salesman has placed at his disposal.

Also, these "ace" buyers see a salesman as quickly as possible. They, too, are part of an organization that sells. They know that a single sales call may cost anywhere from five to ten dollars. They are conscious of the expense that delay means to their own company if their salesmen sit around waiting to see their prospects. With this knowledge, they see the representatives of their suppliers and conduct the sales meeting with efficiency and dispatch. If they cannot do this, they step out quickly or send word that the delay is unavoidable and request a meeting at some other time.

To summarize, let me say that purchasing agents should look to their salesmen for specific information and should make it easy for the salesman to find out what they are interested in. They should depend upon their salesmen to present a complete and honest picture of the products they supply. They should be so thoroughly familiar with the materials they purchase that they can evaluate the detailed information that a salesman is able to give them. I say "should" in each case because in no other way can a purchasing agent get so much profit out of the salesmen who call.

Salesmen, in turn, should give the buyer service in the form of ready information confined specifically to the matters of interest to the buyer. They should know his product and his problems. Such knowledge will enable salesmen to talk "benefits to the buyer" instead of "virtues of the product."

When these conditions are met, a sales call becomes a profitable meeting.

. . . And Vice Versa

by EARLE WEAVER, Manager, Purchasing Department
International Paper Co., New York, N. Y.

I AM scheduled to take a look at the chemical salesman. I can't see that he is much different from any other salesman, or different from operators, executives, laborers, or even purchasing agents. I presume you have to make a living like the rest of us and are ambitious to improve your lot.

Salesmanship is the art of getting people to buy. Intelligent selling is getting people to buy something they need, something that will be of use to them.

So, I would say the first thing we purchasing agents look for in a salesman is a sound knowledge of his product, so he can help us determine whether it is something we really need or not. He must know what has gone into it, how it was made, what its uses are, its advantages and its limitations. He must get this knowledge first-hand. He can't get it merely by reading books or by watching others do the work. He has to do the various jobs himself, and this is not the work of a few weeks. Most planned training courses for salesmen are in my opinion too superficial. They merely hit the high spots.

The salesman also must know something about his prospect's business so that he may be able to suggest where his product can be used to advantage, and why. Often, young salesmen come in, tell me in a sketchy way what they have to offer, and then ask me where I can use it. Such selling reminds me of an old play I recently saw on television. In it a renowned chemist was experimenting in the occult, a la Faust. When he finally succeeded in calling up the devil, he was so frightened that all he could say was, "What do you want?" The devil quite properly replied, "It was you who called me."

Confidentially, most purchasing agents are rather dumb. They don't know much about the things they buy and, often, not enough about their own companies' operations. They depend a great deal on the information they can pick up from the salesmen who call upon them. If you call more or less regularly on a customer, make it a point to have something new to tell him. He will appreciate it, and will look forward to seeing you. I have a friend, a successful salesman, who told me he would never make a call unless he had something new or different about his product, or its use, to talk about. If he couldn't dig up some additional information, he just wouldn't make the call until he could. Purchasing agents welcome that kind of salesman.

From my observations, I would say that fear is the great stumbling block of salesmen. Fear puts limitations on your freedom, binds you with chains you make yourself, and unless you are awake to it, will enslave you completely. If you think you have a good product don't be afraid to say so, and why. And for goodness' sake don't be afraid to ask for an order. That's what you came for.

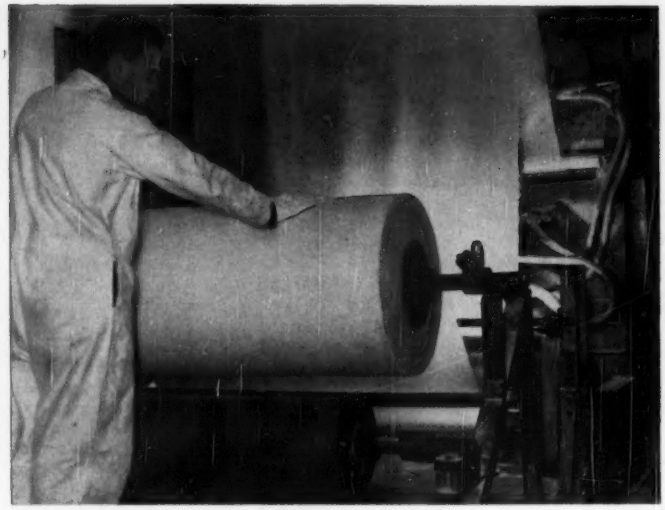
There is no place for defeatism in a salesman. The good salesman must have a reasoned optimism; he must have eager expectation that at least his share of the business available will come his way, and he must be alert to take it when it does. If he keeps looking for orders, keeps working along every avenue expectantly, he will refuse to become discouraged, because there is always one more method or place to try. In this frame of mind, he will always be alert and ready for any opening offered.

The salesman needs vision, enthusiasm, inspiration. Although his job, like most others, has much monotonous routine, the same line of talk to the same sort of buyer, he cannot afford to get into a rut. After all, nothing but a machine repeats the same action in exactly the same way. It takes active intelligence to avoid mere repetition. The human mind is lazy. It hates to have to think. The salesman has to overcome that inertia.

All of this means work. If anyone thinks that the successful salesman is the back-slapping, loud-talking entertainer, he is living in a world of fiction. The art of selling has progressed beyond the point where it has to buy an order through entertainment. Let us hope, also, that the purchasing agent and the art of buying have likewise progressed far enough to recognize such an attempt.

This may be a good place to say, too, that friendship with top officials in the buyer's company or ownership of stock in his company, is no substitute for sound sales effort. The salesman has to work, and work hard, if he hopes to build his business on a solid foundation.

The foregoing two articles are based on talks given by the authors before the New York Section, American Chemical Society, May 10, 1950.



PAPER COATING requires emulsions closely controlled as to resin content and viscosity.

Polymer Emulsion Economies Spur Widening Use

by GEORGE L. BROWN, Research Laboratories, Rohm & Haas Co., Philadelphia, Pa.

WATER IS CHEAP AND IT DOESN'T BURN. That's one of the many reasons why polymer emulsions have preempted a large share of the plastic coating and impregnating field. Easy control of properties is another advantage, but there are limitations and tricky techniques to bear in mind.

DEVELOPMENT of emulsion polymers has been accelerated during the past ten years so that there are at least a hundred synthetic latices commercially available at present. Their development has been accompanied by greatly widening use as the inherent advantages of these systems have become apparent and the disadvantages overcome one by one.

These polymer systems are classified as dispersions from a strict colloid-science viewpoint. The misnomer, emulsion, has apparently become permanent; still, it is useful in describing those substances polymerized from an emulsion of the monomer. The term dispersion is reserved for those polymers which are suspended following polymerization and those which have been emulsion-polymerized, coagulated, and then redispersed for use.

Polymers ranging from very hard, resinous materials, such as polyvinyl chloride and polystyrene, to very soft, elastic polymers, such as the polyalkyl acrylates and rubbers, are now available in emulsion form. Within the past two years, a variety of non-ionic and cationic emulsions have been added to the conventional lines of anionic emulsions. The use of non-ionic emulsifiers allows greater latitude in compounding and modifying the latices. The advent of cationic latices further expands the fields of applicability by providing resin particles that are substantive to cellulose.

The polymer component of the emulsion is composed of particles generally ranging in size from 0.05 to 1.0 microns (5×10^{-6} to 1.0×10^{-4} cm.). The majority of the latices release water to form continuous films that are not redispersible in water. All but a few of the commercial products form continuous films upon air drying. Some heat may be desirable to speed evaporation and to obtain the ultimate in water resistance, but for only a few materials such as unplasticized polyvinyl chloride and polystyrene is heat necessary to fuse the particles into a continuous film.

The latices may be polymers obtained from a single monomer, but more often they are modified by the inclusion of monomeric or polymeric plasticizers or by copolymerization with other monomers. Properties of a copolymer may be very different from properties obtained by physical mixture of the same proportions of two pure polymers, although both techniques are useful in modifying the ultimate film characteristics.

SAFER AND CHEAPER

The elimination of expensive and inflammable solvents looms large as a reason for adopting emulsion polymers wherever possible in coating, impregnating, binding and adhesive uses. The presence of water as the dispersing medium not only reduces cost and safety hazard, but eliminates complicated "solvent balance" considerations.

An additional disadvantage in solvent systems is the limitation on solids content. Viscosity sharply increases as even moderate concentrations are approached, particularly for high-molecular-weight substances. The only limitation in emulsion systems is an upper limit set by geometrical consideration: a maximum of 74.02% for uniform spherical particles. Emulsion polymers are actually available in a 60-70% concentration range. Dilution to lower concentrations may be accomplished with a minimum of precautions: For some polymers the pH should be maintained in a prescribed range, and it is usually wise to add the water in small increments with thorough mixing.

Latices may be easily compounded with water-soluble or water-dispersible substances. Water-soluble polymers, other emulsion polymers, plasticizers, pigments, solvents, and salts may be added to modify the characteristics of the emulsion or the final film. Each latex is highly specific in its tolerance for these substances, but certain techniques for addition may often be developed when initial attempts at admixture are unsuccessful.

In adhesive applications, the highest possible solids concentration is often desired. Elimination of a very small amount of water "sets" the emulsion by agglomerating the particles as the water content decreases to a volume less than the voids space between the compacted spheres.

High viscosities, when desired, may be achieved by adding water-soluble polymers, i.e., thickening agents. In paper coating applications, where a continuous surface film of minimum coating weight is sought, a careful balance must be made of the lowest possible coating weight to give continuity and the highest workable viscosity to prevent "strike-in". For each application this rather narrow optimum range of emulsion and thickener concentrations must be experimentally determined from the wide ranges available.

Although compromises in the viscosity-solids balance of polymers in solution may be achieved by blending high and low viscosity substances, the limit of the solids content may be rather severely circumscribed if film properties are not to be sacrificed. The viscosities of unmodified latex systems are not dependent upon the molecular weight of the polymer.

SMALL AMOUNTS USEFUL

Depending upon the mode of application and the emulsion polymer used, continuous or discontinuous deposition may be achieved. In certain cases the latter may be desirable from the standpoint of economy. In sizing fabrics (e.g., the "permanent" starches recently promoted in retail sales) the resin concentration used is very small: 2 to 5% on the fabric. Particles deposited at the juncture of the fibers are probably most effective in stiffening the fabric, and the resin concentration could obviously be further reduced if a mechanism were perfected for placing polymer particles only at these points.

In certain pressure-sensitive adhesive uses with an irregular backing material, such as cloth or paper, it is quite probable that sparsely distributed "lumps" of polymer are more effective than a thin, uniform film of equal weight which would come into juxtaposition with the second surface only at a few points.

Certain articles may be formed more easily or more quickly by coagulation than could be done by a solvent release process. The coagulation of polymer emulsions—particularly rubbers—under specific conditions is responsible for the large amount of emulsions used in dipped goods manufacture. Plastic resin emulsions have not been extensively exploited except as toughners or modifiers for rubbers, partially because satisfactory coagulation techniques have not been developed.

LIMITATIONS

Features of these products which may limit their usefulness include the difficulty in achieving continuity and gloss in the final film. This objection has been largely overcome in the past few years, however, and most of the products now available give continuous films upon air drying.

Polymers deposited from solution are left in a continuous film as the brush-heap of molecules becomes more compact through solvent loss. Emulsion polymers, on the other hand, do not deposit this interlocking structure, but leave a mosaic of spheres which must be coalesced to achieve continuity. The viscosity of the polymer must be low enough to allow flow under the surface forces tending to coalesce the polymer spheres. These surface forces are surprisingly great, however, and all but the hardest polymers fuse upon evaporation of the water at room temperature. The very hard polymers, such as unplasticized polyvinyl chloride or polystyrene, may be fused by heating or by addition of plasticizers to the polymer emulsion.

The presence of emulsifying or dispersing agents may detract from the ultimate water resistance of the films. Again, this is not the liability which it might appear at first thought, for the surface-active agents are not easily wet in the fused film. Experimental comparisons of volatile or heat-convertible emulsifying agents with the conventional fixed agents indicate that there is little advantage in most cases in removing the emulsifier, especially if complete fusion of the film is achieved. The major portion of the emulsifier is apparently buried in the polymer particle or shielded by the outermost layers. Where ultimate water resistance is desired, the emulsifier may be leached from the dried film by prolonged water immersion.

In a few cases, particularly in the past, unreacted monomer has been allowed to remain in the emulsion. Good manufacturing practice eliminates virtually all of the monomer. The remainder is volatilized during application, the only disadvantage being the rather unpleasant odor of even traces of certain monomers.

The possibility of coagulation of the polymer, although primarily a desirable trait, is a double-edged characteristic. Since emulsions are thermodynamically unstable systems, care must

TABLE I: Commonly Used Monomers in Commercial Polymer Emulsions

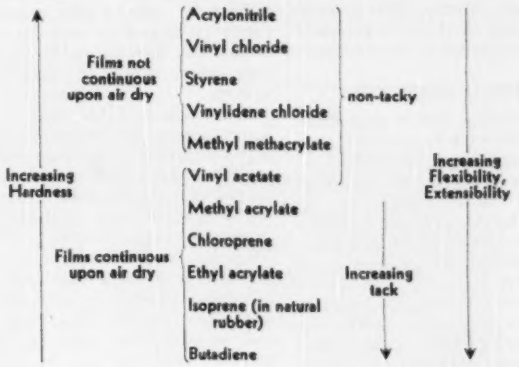


TABLE II: Polymer Properties Contributed by Various Monomers

Monomer	U. V. light resistance	Oil resistance	Water vapor impermeability	Adhesion	Ozone, oxygen resistance
ACRYLICS	X	X		X	X
ACRYLONITRILE	X	XX			X
BUTADIENE					
CHLOROPRENE		X		X	
STYRENE	X				X
VINYLIDENE CHLORIDE		X	XX		X
VINYL ACETATE	X	X		XX	X
VINYL CHLORIDE		X	X		X

(XX = outstanding performance)

be taken to prevent coagulation by freezing, excessive heat or by harmful additives.

Since the polymer is diluted with water, shipping costs are higher than for the pure polymer. This is more often than not offset by the decreased preparation required of the customer.

COMMERCIAL COMPOSITIONS

Monomers employed in large quantities in commercially available resin emulsions are listed in Table I in approximate order of the decreasing hardness of their polymers.

In addition to polymers of those shown, a variety of polysulfide dispersions are available with varying physical properties.

Most of the available latices utilize two or more monomers to achieve desired balances of hardness, flexibility, tack, elasticity, and resistance properties. Each of the monomers contributes certain properties to a copolymer, although it is not safe to assume an exact quantitative dependence of properties upon composition.

The principal properties contributed to a polymer by a series of monomers are summarized in Table II. In addition to these characteristics, cost may be very important in determining the polymer chosen for a specific application.

Inhibitors may be added to improve resistance to ultraviolet light and to oxidation. The table describes the performance of uninhibited systems, although the polymers of butadiene, chloroprene, vinyl chloride, and vinylidene chloride are almost always used with compounding ingredients which may be supplied in the emulsion or added later, depending upon the particular product.

APPLICATION TECHNIQUES

Practically all standard methods of application are routinely used with emulsion polymers. These include spraying, brushing, roller and knife coating, and immersion impregnation. Each emulsion is specific in its behavior under each of these techniques, but proper observation of conditions necessary for maximum stability may allow use of a slightly modified emulsion where the unmodified emulsion is unsatisfactory.

Emulsions are best preserved at moderate temperature. Freezing will coagulate most, but not all, polymer emulsions, and heat hastens coagulation through increased frequency of particle collision.

Pressure sensitivity, the tendency of an emulsion to coagulate under a strong shearing force, is very sharply dependent upon polymer concentration. A reduction of solids by one tenth or more often permits milling or roller application where the polymer is unstable as supplied. If this is not feasible addition of water-soluble protective agents (such as those used for thickening) may increase stability greatly even when added in very small amounts.

The colloidal charge must be observed, cationic and anionic reagents not being mixed. Despite the obvious nature of this precaution, many users attempt to mix incompatible substances.

The emulsion may be stable in a limited pH range. Polymers such as Neoprene (polychloroprene) which are made with fixed soaps should be kept fairly alkaline by addition of a fixed alkali (NaOH). Many emulsions such as the anionic Rhoplex (polyacrylate) emulsions may be adjusted over a wide range of acidity or basicity, although it is recommended that a neutral emulsion be used where possible. Such emulsions should not be kept under extremely acidic or basic conditions for a long period because of the slow hydrolysis of the polymer that results.

Where salt or water-soluble polymers are to be added, an experimental determination of the maximum concentration permissible for the added substance is necessary. Non-ionic emulsions are far less susceptible to coagulation by these additions than are the ionic analogs. Solvents may sometimes be added, either in small amounts or diluted with water. All solvents are usually harmful where long-term stability is desired.

Solutions or dispersions must be adjusted to the pH range permissible for the latex before addition is made, or precipitation may occur upon admixture.

PLASTICIZATION

Monomeric plasticizers, when properly added, exhibit compatibility with and plasticize the polymer to the same extent as when mechanically mixed with the dry polymer. It is necessary that the plasticizer thoroughly penetrate the emulsion particle, which may require incorporation of the plasticizer 24 hours or more before use. If this is not done, the resulting film may at first be oily until homogeneity is achieved by diffusion.

Plasticizers may be easily stirred into some emulsions, particularly very viscous systems. In other cases it may be found that sufficient mechanical agitation will accomplish complete dispersion. Generally, however, emulsification prior to addition is necessary.

Plasticization may also be accomplished by addition of softer polymers. Resulting mechanical properties are not the same as when copolymerization or milling is used to mix the polymers, since the emulsion particles are probably deposited in a mosaic pattern, no diffusion being possible because of the high viscosity of the materials.

The majority of the emulsions now available deposit continuous films upon room-temperature drying. For maximum strength and resistance properties, heating of the polymer may be desirable. In certain cases (unmodified polyvinyl chloride, polyacrylonitrile, polystyrene) film continuity does not result from room-temperature drying. Heating of these materials to the fusion point may be employed, or occasionally solvents may be added to the emulsion to dissolve the polymer just enough for particle fusion to occur.

LATEX THICKENING

Among the water-soluble polymers available for increasing the viscosity of latices are sodium polyacrylate (Acrysol GS), methyl cellulose (Methocel), sodium carboxymethyl cellulose, hydroxyethyl cellulose, casein, the various natural gums, and sodium and ammonium alginates.

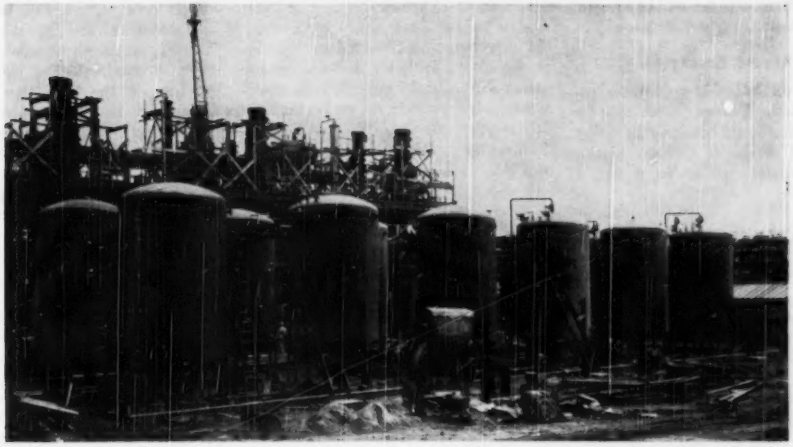
Thickening efficiency cannot be predicted from an examination of the water viscosity of the thickening agent. The extent of thickening is apparently a result of the specific interactions of the agent with the latex, and seems to be particularly dependent upon the emulsifying agent employed. It is also dependent upon the latex concentration.

The concentration of the thickening agent that is added to the latex must be carefully regulated. Addition of concentrated solutions will often result in coagulation of the latex, whereas a more dilute solution may have no unfavorable effect.

Addition is usually best accomplished by adding a small amount of the emulsion to the thickener solution, followed by stirring and further latex addition. If thickener is added to the latex, chunks of the very viscous thickener will form and may be difficult to disperse thoroughly.

PIGMENT ADDITION

Pigments may be added to resin emulsions providing the materials are dispersible in water and are non-reactive toward the emulsion. It is generally preferable to disperse the pigment completely in water prior to addition. This is often facilitated by the use of dispersing agents of the Triton R-100 type, polyphosphate dispersants, etc. Direct addition of solid pigment is sometimes possible, but coagulation of the emulsion or lumping of the pigment may result.



ETHYLENE OXIDE'S rapid growth is symbolized by the new Institute, W. Va., unit of Carbide and Carbon, which is to be completed this fall.

A **CI** REPORT ON

ETHYLENE OXIDE

by R. F. MESSING
Arthur D. Little, Inc., Cambridge, Mass.

Production capacity for ethylene oxide is currently increasing more rapidly than for any other tonnage chemical. Here the author provides a comprehensive picture of production processes and end-use pattern.

PRODUCTION of ethylene oxide has more than doubled since the end of World War II, and gives promise of further expansion as demand for its derivatives increases. Although most of the current output is used by the producers in the manufacture of derivatives and does not appear in the usual trade channels, it is one of the leading organic chemicals, with 1949's production valued at $62,000,000. Since ethylene oxide serves as an intermediate in the manufacture of ethylene glycol, the market position of ethylene oxide is closely linked with that of the glycol. Ethylene oxide is of interest to the chemical industry not only because of the substantial raw material requirements, ethylene, air, and chlorine, but also because it enters into the manufacture of many other compounds including the polyglycols, ethanolamines, non-ionic detergents, and acrylonitrile.

PROCESSES

Two processes are now used commercially for manufacture of ethylene oxide. The chlorhydrin route is the older and is estimated to have accounted for about two-thirds of the total output in 1949. Although much of the recent capacity expansion has been based upon the newer catalytic oxidation process, the two newest producers —Wyandotte Chemicals Corp. and Jefferson Chemical Co.—both utilize the chlorhydrin process.

CHLORHYDRIN PROCESS

This route involves two essential steps, chlorhydrination of ethylene followed by hydrolysis of the resultant ethylene chlorhydrin:

(1) $CH_2=CH_2+HOCl \longrightarrow CH_2(OH)-CH_2Cl$

(2) $2CH_2(OH)-CH_2Cl+Ca(OH)_2 \longrightarrow 2CH_2(O)CH_2+CaCl_2+2H_2O$

Ethylene is first reacted with hypochlorous acid in water solution at a moderate temperature level to give ethylene chlorhydrin. Hypochlorous acid is formed by bubbling chlorine into water. Unabsorbed ethylene is recycled after a portion, established by economic considerations, is vented. Ethylene dichloride formed by reaction with chlorine is the principal by-product, and appears in amounts of 0.1-0.2 pounds per pound of oxide produced. A smaller amount of dichlorethyl ether is also obtained as a by-product.

Chlorhydrin solution from the reactor is next treated with lime slurry at elevated temperatures, and the ethy-

lene oxide formed is removed as a gas, and fractionated to about 99% oxide.

CATALYTIC OXIDATION

Catalytic oxidation is employed commercially in the United States only by Carbide & Carbon Chemicals Division of Union Carbide & Carbon Corp., produces ethylene oxide in a single step.

$$2CH_2{=}CH_2 + O_2 \longrightarrow 2CH_2{-}CH_2 \quad (\text{O bridge})$$

Essentially S-free ethylene, 90-95% pure, is mixed with air to give an ethylene concentration of 3-5%. The mixture is passed over a supported silver catalyst maintained at 200-300° C. by heat exchange with circulating oil. Contact time is about 3 seconds. Ethylene oxide is formed directly in 50-60% yield with a 40% conversion per pass.

Ethylene oxide is removed from the exit gas stream by absorption with water under pressure. Some glycol is always formed at this point. About 50% of the absorber off-gas, containing about 1% ethylene, is recycled and the remainder vented. The ethylene oxide is flashed from the absorber solution by heat and pressure reduction, dried, compressed and condensed for storage.

Most research on catalytic ethylene oxidation has been on catalyst improvement. Numerous methods of preparing catalysts have been disclosed by patents, but all employ silver as the principal active ingredient. Anticatalysts such as ethylene dichloride have been used experimentally by the National Research Council of Canada to reduce CO_2 formation. However ethylene dichloride has a tendency to poison the catalyst if used in excessive amounts. So far as is known, anticatalysts are not being used commercially at present.

In the oxidation step temperature control is extremely important. The reaction can easily become uncontrollable if the optimum temperature for a specific catalyst is greatly exceeded. To control the reaction temperature better, considerable experimental work has been carried out to develop a fluid catalyst technique. However, this method does not appear to have been adopted by the industry.

The addition or presence of water in controlling the heat release in the reaction was the critical issue in a patent suit between Carbide & Carbon and U. S. Industrial Chemicals, Inc. (USI) extending through the period 1941-1946. The original Lefort patent (U.S. 1,998,878) which Carbide & Carbon used as the basis for its process included claims which specified "subjecting ethylene to the simultaneous action of the oxygen of air and of water." In a reissue patent (Re. 20,370), the claims were broadened so that water was no longer a necessary component, but this patent was voided by the Supreme Court in 1942. A later reissue patent (Re. 22,241) specified use of reaction mixtures containing water, but this reissue was also held invalid in a declaratory judgment in 1946 in favor of USI.

Use of oxygen rather than air has also been investigated in recent years both for fixed-bed and fluid-bed operations. The main reason for utilizing oxygen is probably to reduce reactor size, but since inerts (mainly nitrogen when air is used) aid in controlling reaction temperature, it is not certain that oxygen will be widely adopted. Furthermore, oxygen requirements for ethylene oxide are not sufficient to support an economic sized oxygen plant, so that integration with other oxygen-consuming operations would probably be required.

COMPARISON OF PROCESSES

An advantage of the chlorhydrin process over catalytic oxidation is the ability to use an ethylene stream of lower purity. Depending upon the relative economics between ethylene purification and increased equipment sizes for chlorhydrin manufacture, ethylene concentrations as low as 40% by volume may be used. Hydrogen, methane, and ethane may be included, but as a rule, propylene is excluded in order to avoid contaminating ethylene oxide with propylene oxide. The Barbieri process used by Wyandotte, uses a mixture and fractionates the oxide mixture.

Saturated hydrocarbons and hydrogen are detrimental to the oxidation process because their oxidation involves large heat release which makes temperature control difficult.

For plant sizes below 20-30 million pounds per year, the chlorhydrin process, depending upon specific cases, will show considerable saving in investment over catalytic oxidation. Above this plant-sized range, calculations show slight advantage to the oxidation process since multiple units would probably be required for the chlorhydrin plant.

Yields of ethylene oxide by the chlorhydrin process, based on both ethylene and chlorine are in the range of 70-80%, although usable by-products are also obtained. The yield based on ethylene in the oxidation process is 50-60%, with the remainder lost as water and carbon oxides. Ethylene costs, therefore, are more important for the oxidation route, especially since ethylene of high purity is normally employed. Costs for concentrated ethylene have increased from about 2¢ per pound in 1946 to 3-5¢ per pound at present.

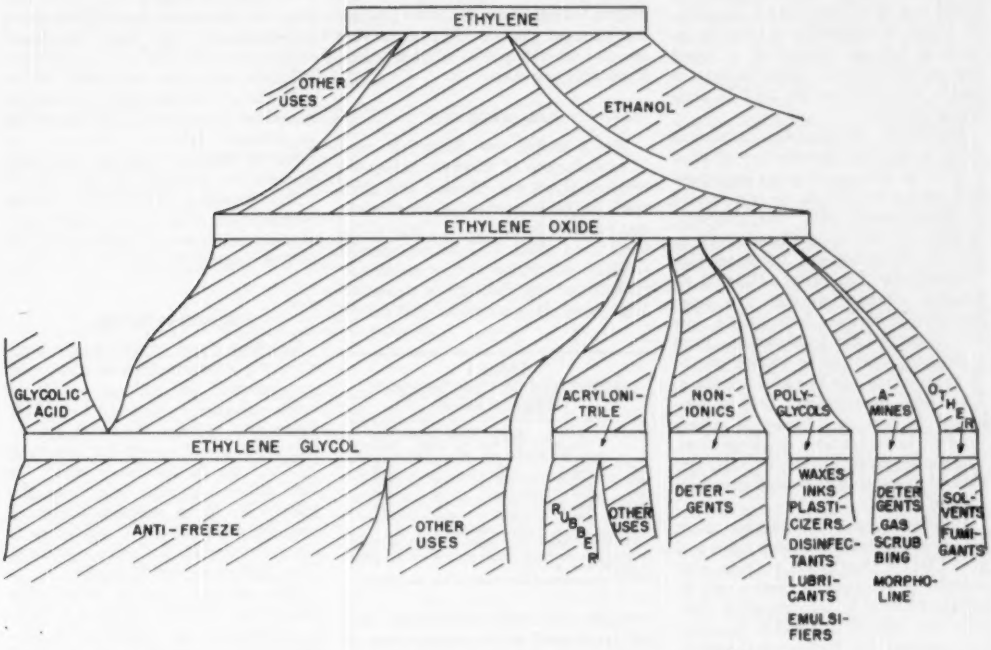
The price of chlorine is an important consideration in the chlorhydrin process. The chlorine used amounts to about two pounds per pound of oxide. Since air is used directly, the oxidation process is essentially unaffected by the price of the oxidizing agent. No by-products are formed in the oxidation process, which simplifies both production and marketing. Depending upon the market, by-product ethylene dichloride can affect the economics of the chlorhydrin process significantly, inasmuch as its output amounts to about 20% of the ethylene oxide production.

At ordinary temperatures and pressures, ethylene oxide is a colorless gas which liquifies at 11° C. Since the material is easily vaporized and the vapor is both inflammable and an explosive,[13] special precautions are required in handling and shipment. These characteristics have probably contributed to its preponderant use by the producer at the site of manufacture.

PRODUCERS AND PRODUCTION

There are at present four major U. S. producers of ethylene oxide. Carbide & Carbon was first in the field, and is understood to utilize both the chlorhydrin and oxidation routes at S. Charleston, W. Va., and Texas City, Texas, only the oxidation route at Whiting, Ind. The remaining three producers—Dow Chemical Co., Jefferson, and Wyandotte—all employ the chlorhydrin route. The last two producers have entered the field within the past five years, and all three produce the oxide as an adjunct to glycol manufacture. Although operating procedures may vary, it is believed to be general practice to separate the oxide as an intermediate product in glycol manufacture by the chlorhydrin route to avoid contamination of the glycol with chlorides formed in chlorhydrin neutralization. In addition to the companies mentioned above, E. I. du Pont de Nemours & Co. manufactures ethylene glycol by a route which does not involve use of the oxide. Formaldehyde is reacted with carbon monoxide and water to form glycolic acid. After esterifying the acid with methanol the resultant methyl gly-

APPROXIMATE VALUE RELATIONSHIPS AMONG ETHYLENE OXIDE INTERMEDIATES AND DERIVATIVES 1949



colate is hydrogenated to form methanol and glycol.

Production of ethylene oxide has not been reported by Government or trade sources as disclosures would have revealed the operations of individual producers. Some approximations are possible, however, knowing the volume of production of ethylene glycol, the percentage produced by routes involving ethylene oxide, and the extent of manufacture of some of the other derivatives of the oxide. Pertinent data are summarized in Table 1, which shows that ethylene oxide production has increased from an estimated 150 million pounds in 1945 to 380 million pounds in 1949.

Capacities for manufacture of ethylene glycol by individual companies are estimated in Table 2. Glycol capacity is subdivided into plants operating in 1949, plants under construction or recently completed, and proposed new plants. Also indicated in the table is the estimated "net" oxide capacity by company, excluding that used for glycol. These figures are based upon the indicated consumption of ethylene oxide in manufacture of all derivatives, including ethylene glycol.

Several new plants are under construction or in the active planning stage. Carbide & Carbon announced in early 1950 that, in addition to plant extensions at Texas City, Texas, and Institute, W. Va., completed in late 1949, new facilities at Institute, W. Va. and Whiting, Ind., will be completed by early 1951.[1] The first of these three new units began operation at Whiting, Ind., in May. One more at Whiting and another at Institute, W. Va. will follow. It is understood that the synthesis in these facilities will be by oxidation of ethylene with oxygen rather than air. These units, together with other planned facilities, were reported to have sufficient capacity to increase the end-of-1949 capacity in the United States by 50%, but indications are that a portion of the new facilities may represent replacement of older chlorhydrin plants. The net plant addition is estimated to amount to 70 million pounds of ethylene glycol, equivalent to 55 million pounds of oxide.

Jefferson has also been engaged in a program of expansion. Completion of portions of its glycol facilities at Port Neches was scheduled on April 1, 1950.[2] Much of this increase may represent more effective utilization of existing facilities, however, with new construction limited to expansion of those facilities which were bottle-necks in the process. Based on the indicated 1949 rate of production, it is estimated that the new capacity amounts to 35 million pounds of glycol per year, equivalent to 25 million pounds of oxide. The Dow Chemical Co. has recently announced that construction will start soon on additional glycol and oxide facilities at Freeport, Texas.

Two other companies, not now producing ethylene oxide or glycol, are planning entry into the field. The first, Great Southern Chemical Corp., has been formed by Chicago Corp., Pontiac Refining Co., La Gloria Corp., and Wyatt C. Hedrick Eng. Corp. Great Southern Chemical plans conversion of a war surplus aviation gasoline plant at Corpus Christi, which was purchased from the Government in early 1950 for $756,000, for manufacture of ethylene

oxide and glycol. Early reports were that output would amount to 60 million pounds per year plus 10 million pounds of oxide[3] but later evidence has led to an estimate of 40 million pounds of glycol and 10 million pounds of oxide. By virtue of availability of some equipment at Corpus Christi, it is hoped that production may begin in time to supply material for the 1951-52 antifreeze season.

Mathieson Hydrocarbon Chemical Corp. is planning manufacture of ethylene oxide and glycol in an integrated $20 million facility to be constructed at Brandenburg, Ky. The company, formed by Mathieson Chemical Corp. and the stockholders of Tennessee Gas Transmission Co., with additional financing arranged through two large insurance companies, is to build a pipe line to carry light hydrocarbons from a stripping plant to be located on the Tennessee Gas pipe line at Greensburg, Ky. These hydrocarbons will be separated to give an ethane-rich stream for feed to an ethylene cracking plant. The remaining hydrocarbons, LPG and natural gasoline, will be sold primarily for use as fuel.

Ethylene from the cracking plant will be converted to ethylene oxide and glycol by the chlorhydrin process, with chlorine to be obtained from a new $6 million plant to be constructed at Saltville, Va. This facility will be leased to and operated by Mathieson Chemical, with option for purchase at the end of the lease period. Eventual output of ethylene glycol is estimated at 71 million pounds annually, in addition to 10 million pounds per year of ethylene oxide. All of the initial glycol has been sold on contract covering a 7-year period to a major marketer of permanent-type antifreeze.

The Hancock Oil and Refining Co. of Long Beach, Calif., has expressed interest in glycol manufacture to serve West Coast needs.[4] However, decision on this project is believed to have been deferred for the present. Early indications were that the capacity of the proposed plant was relatively small, about 20 million pounds of glycol annually.

Summarizing the data on plant extensions, it appears that new plants already under construction or recently completed will provide capacity for an additional 105 million pounds of glycol annually. Thus there will be a total capacity of 605 million pounds available by the 1950-51 antifreeze season. Assuming that the Dow, Great Southern and Mathieson Hydrocarbon plants are completed the following year, there will be a total capacity of well over 715 million pounds of glycol. This figure represents a 62% increase over the 1949 level of production, and is over three times that in existence five years ago. In addition to these extensions in glycol capacity, there will be additional net capacity for manufacture of at least 20 million pounds of ethylene oxide. Net oxide capacity is now 100 million pounds annually. Some producers may, of course, elect to market more of their output as ethylene oxide if demand warrants.

RAW MATERIALS

The principal raw materials used in manufacture of ethylene oxide and ethylene glycol are ethylene and chlorine. In 1949, production of ethylene was reported by the U. S. Tariff Commission as about 1.13 billion pounds, although calculation of consumption in various end uses indicates a somewhat larger total. It is estimated that nearly one half of the reported ethylene production is used in the manufacture of synthetic ethanol. The second largest outlet is believed to be in the manufacture of ethylene oxide and glycol, which consumed about 31% of the ethylene produced in 1949 (350 million pounds).

TABLE 1
PRODUCTION OF ETHYLENE OXIDE
(Millions of pounds)

	Total Glycol Production[1]	*Oxide Used For Glycol*[2]	*Oxide Used For Other Purposes*	*Total Oxide Production*
1945	205.1	115	35	150
1946	192.2	110	45	155
1947	226.7	130	55	185
1948	336.7	235	75	310
1949	439	280	100	375

[1] Source: U. S. Tariff Commission.
[2] Includes oxide equivalent of thylene chlorhydrin, but excludes oxide equivalent of glycol produced from glycolic acid.

Chlorine requirements for manufacture of ethylene oxide and glycol are relatively moderate, amounting to an estimated 250,000 tons in 1949, about 14% of total production (1,770,000 tons). This use of chlorine should continue to increase as at least one of the projected glycol plants will be based upon the chlorhydrin route.

No data are available to indicate oxygen consumption in ethylene oxide manufacture, although it is understood that at least a portion of Carbide & Carbon's new capacity may utilize oxygen as the oxidizing agent. Such installations will probably be most economic when located where oxygen plants are already installed, or where installation may be warranted by other demands. It does not seem likely that sufficiently low-cost oxygen can be made available from units constructed to supply demands from an ethylene oxide plant alone.

END USES

The estimated end-use distribution for ethylene oxide is shown in Table 3. These values show the preponderant use of oxide in manufacture of glycol, 74% of total consumption. It is of further interest to note that most of these uses are captive, i.e., the derivatives are also made by ethylene oxide manufacturers. The only significant non-captive markets are in acrylonitrile and non-ionic detergents. However, the only producer of acrylonitrile, American Cyanamid Co., is supplied by an affiliate, Jefferson Chemical Co. Sales of ethylene oxide in these two markets are estimated to be about 50 million pounds in 1949, or 14% of total consumption. The U. S. Tariff Commission has reported 1949 sales at 53 million pounds.

ETHYLENE GLYCOL

Ethylene glycol constitutes the largest single outlet for ethylene oxide, with an estimated 280 million pounds of oxide converted to glycol in 1949. This figure also includes the oxide equivalent of all glycol except that produced by Du Pont. As previously noted, Du Pont utilizes a process based upon glycolic acid. In an estimated order of size, the principal U. S. producers of glycol are Carbide & Carbon, Du Pont, Dow, Jefferson, and Wyandotte.

The estimated end-use distribution for ethylene glycol is indicated in Table 4. Antifreeze has traditionally consumed about two-thirds of the total production of ethylene glycol. In 1949, it is estimated that 330 million pounds of glycol were used as antifreeze, about 75% of total glycol production. This figure includes the moderate amount of glycol used in military vehicles and off-the-road vehicles such as farm tractors. In addition to the glycol consumed in antifreeze, it is estimated that about 30 million gallons of methanol and 26 million gallons of ethanol were used in antifreeze. Ethylene glycol, of course, has the advantage over these materials of "permanency," as it is essentially nonvolatile. The proportion of the total antifreeze market supplied by ethylene glycol increased to about 38% of the total in 1949, although it sells at a considerable premium over the volatile types. The price of the glycol in the 1949-50 antifreeze season was about $3.50 per gallon at retail, as compared with $1.25 for methanol and $1.00 for ethanol.

Prospects are for a substantial increase in glycol sales for antifreeze. If the price differential between glycol antifreeze and the volatile types is narrowed, glycol should increase its share of the market because of known consumer preference for this material. Trends in automobile registrations also indicate an increase in total consumption of antifreeze during the next few

TABLE 2—MANUFACTURERS OF ETHYLENE GLYCOL AND ETHYLENE OXIDE

Company *End of 1949 Capacity*	*Plant Location*	*Ethylene Glycol Capacity (Million Lbs. per Year)*	*Ethylene Oxide Capacity (Millions Lbs. per Year)*	
			Total	*Excess Over Needs for Gylcol*
Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp.	So. Charleston, W. Va. Institute, W. Va. Texas City, Tex.	225	215	45
Dow Chemical Co.	Midland, Mich. Freeport, Tex.	85	90	25
E. I. du Pont de Nemours & Co.	Belle, W. Va.	90	..	..
Jefferson Chemical Co.	Port Neches, Tex.	65	80	30
Wyandotte Chemicals Corp.	Wyandotte, Mich.	35	25	small
	Subtotal	495	410	100
Plants Under Construction or Recently Completed				
Carbide & Carbon Chemicals Div.	Institute, W. Va. Whiting, Ind.	70	55+	?
Jefferson Chemical Co.	Port Neches, Tex.	35	25+	?
	Subtotal	105	80+	—
Proposed Plants				
Dow Chemical Co.	Freeport, Tex.	..	..	..
Great Southern Chemical Corp.	Corpus Christi, Tex.	40	40	10
Mathieson Hydrocarbon Chemical Corp.	Brandenburg, Ky.	70**	65	10
	Subtotal	110+	105+	20+
	Grand Total	710+	595+	120+

* Equals oxide production entirely converted to glycol.
** Estimated eventual capacity. Initial unit probably much smaller.

years. However, this increase amounts to only about 3-4% annually.

Although employed, use of other glycols such as propylene glycol and hexylene glycol is limited because of lower efficiency and consequent higher cost per unit of antifreeze protection. One factor difficult to assess at present is the possibility of development of new types of automotive engines which may employ a "sealed-in" coolant, or which may operate in different temperature ranges. The large number of vehicles with conventional cooling systems now on the road, however, will make any such change a gradual one.

Ethylene glycol also finds use in a wide variety of industrial applications. Its dihydric character enables it to be used in chemical manufacture where glycerin and pentaerythritol are also commonly employed. Many of the other industrial uses depend upon the humectant properties of ethylene glycol, while still others are based upon its freezing point depression of water. In instances where ethylene glycol competes with glycerin, glycol is frequently favored because of its low price, amounting to 14.5¢ per pound as compared with 24-25¢ for glycerin.

The largest industrial application is for manufacture of the dinitrate for use as an explosive. Although not as powerful as nitroglycerin, its lower freezing point enables use of nitroglycerin-glycol dinitrate in freezing weather. Based on Bureau of Mines reports of industrial explosives production, it is estimated that approximately 24 million pounds of glycol were used by the explosives industry in 1949. This consumption has probably reached a reasonably stable level.

Because of its humectant action, ethylene glycol exerts a softening effect on fibers and films. An important consuming industry for the glycol is the manufacture of cellophane. Although glycerin is preferred and used in greater quantities, glycol's lower price makes it attractive for use in conjunction with the glycerin. Assuming reasonable stability of the price structure for glycerin and glycol, growth in this outlet should parallel growth in total cellophane production.

Only minor quantities of glycol are used for softening and plasticizing paper, leather, and fibers because glycol is more volatile than glycerin and because of possible toxicity hazards. However, there are some instances when a mixture of glycerin and glycol is suitable. It is of interest to note that U. S. glycerin production is now about 210 million pounds annually, of which about 40%, or 85 million pounds, goes into humectant applications. By comparison, glycol consumption in humectant applications totals perhaps 19 million pounds.

Although chemical derivatives are among the more important outlets for ethylene glycol, it is not feasible in every case to separate the uses of glycol from those for oxide. For example, either ethylene glycol or ethylene oxide may be used in making the di-, tri-, or polyethylene glycols. This possibility is discussed in the later section on polyglycols.

Alkyd resins, polyesters formed from a dibasic acid and a polyhydric alcohol, are estimated to have consumed about 5 million pounds of glycol in 1949. The glycol alkyds have a linear chain structure and thus tend to exert a softening or plasticizing effect on alkyds derived from other polyfunctional alcohols. The glycol alkyds are used in various low-pressure laminates as well as in other resin formulations where these softening properties are desirable. Although mixtures of glycol and pentaerythritol were used as glycerin substitutes during and after the war when glycerin was in short supply, this use has been reduced considerably. Reports of the U. S. Tariff Commission show that production of the mixed ester with phthalic anhydride dropped from 5.1 million pounds in 1947 to 3.7 million pounds in 1948. Polyester resins which incorporate ethylene glycol are also used to some extent as plasticizers for the vinyl resins where a "permanent-type" plasticizer which will not migrate from the vinyl product is necessary.

Ethylene glycol finds considerable use in industrial installations where a coolant or antifreeze is required. Installations dependent upon refrigeration often employ glycol as the circulating medium. Brines may be used for the same purpose, but tend to corrode some types of systems excessively.

Snow and ice removal systems represent an interesting opportunity for growth in consumption of glycol. Sidewalks, roadways, and airport runways may be freed from snow and ice by circulation of a heated liquid through pipes imbedded under the surface. Installations of this type are reported to be increasing at the rate of 100 per year, and it is reported that one large installation on an 8,000 foot runway at Idlewild Airport in New York City will utilize 300,000 gallons of a 50% glycol solution.

Hydraulic brake fluids and adhesives are included among the smaller industrial outlets for ethylene glycol. The glycol is usually used as a diluent with other materials such as castor oil in hydraulic fluids, and has the advantage over other chemicals used for the same purpose of causing less swelling of rubber gaskets and seals. Consumption of ethylene glycol for hydraulic fluids is estimated to be about 4 million pounds annually.

About one million pounds of glycol annually are believed to be consumed in paste to join sheets of aluminum foil in electrolytic condensers. Other adhesives, particularly specialty starch adhesives, also consume a similar quantity.

Glyoxal[10] has developed rapidly within the past few years as a consuming outlet for ethylene glycol, although consumption is still relatively small. It is made by only one company in this country, Carbide & Carbon, by a synthesis based upon oxidation of ethylene glycol. Most of the output is utilized by Cluett-Peabody & Co., Inc., in shrinkproofing viscose rayon fabrics by its Sanforset process. The indicated requirement for glyoxal in this process is about 0.2 ounces per square yard of fabric treated. Usage of glyoxal is estimated to be of the order of 250,000 pounds annually, requiring less than

one million pounds of glycol per year.

Exports accounted for disappearance of ten million pounds of glycol in both 1948 and 1949. Reports of the Bureau of Foreign and Domestic Commerce show that the bulk of this glycol is shipped to Canada. Dow recently doubled the capacity of its glycol plant at Sarnia, Ont.[5] Thus the volume of exports is expected to decline.

Synthetic fibers represent an attractive future growth opportunity for ethylene glycol. Most prominent is the fiber produced by condensing terephthalic acid (which may be obtained by oxidizing p-xylene) and ethylene glycol.[11] This fiber, a Du Pont product, has been known by the names Terylene and Fiber V. As in the case of other new fibers, Fiber V is notable for its excellent resistance to weathering and chemical attack, and may prove to be in a more favorable cost position than other types. Since only about one-tenth of the weight of the material represents the glycol portion, however, sizable production must be attained before glycol requirements become significant.

ACRYLONITRILE AND ACRYLIC ACID

A most important use for ethylene oxide is to make ethylene cyanhydrin for conversion into acrylonitrile and acrylic acid. Acrylonitrile is now produced commercially in this country only by American Cyanamid Co., whose capacity is 27 million pounds annually. American Cyanamid combines ethylene oxide (obtained from its affiliate Jefferson Chemical) with hydrogen cyanide, which in turn is derived ultimately from calcium cyanamide. Dehydration of the resultant cyanhydrin forms acrylonitrile, while hydrolysis gives acrylic acid. Polyacrylate esters are used to improve the viscosity index of lubricating oils and as adhesives.

Most of the acrylonitrile output currently goes into the manufacture of nitrile rubber (Buna-N type). Because of its high degree of resistance to oils and other hydrocarbons this rubber has been widely used for gasoline tank linings, oil hoses, bushings for motors parts, and the like. Production of Buna-N rubber in 1949 has been reported as 11,072 long tons, equivalent to about 9 million pounds of acrylonitrile. Growth prospects for nitrile rubber are favored by its adaptability for use in blends with the vinyl and phenolic resins to achieve special properties. An important limitation of the rubber, however, is its susceptibility to oxidation and discoloration, although this can be offset to a large extent by proper forformulation.

Other important present uses for acrylonitrile are in copolymers with vinylidene chloride, which are marketed by Dow for paper coating to increase waterproofness, and in fumigation.

TABLE 3
ESTIMATED END USE DISTRIBUTION FOR ETHYLENE OXIDE, 1949

	Millions of Pounds
Ethylene glycol	280
Polyglycols	25
Acrylonitrile and Acrylic Acid	24
Alkylolamines	21
Non-ionic detergents	15
Other	15
Total	380

TABLE 4
ESTIMATED END USE DISTRIBUTION FOR ETHYLENE GLYCOL, 1949

	Millions of Pounds	*%*
Automotive antifreeze	330	75.0
Industrial explosives	24	5.4
Cellophane, fibers, paper, & leather	19	4.4
Polyglycols, esters, & miscellaneous chemicals	14	3.2
Alkyd resins	5	1.1
Industrial coolant & antifreeze	5	1.1
Hydraulic fluids	4	0.9
Adhesives	2	0.4
Glyoxal	1	0.2
Miscellaneous	26	5.9
Subtotal	430	
Export	10	2.4
Total	440	100

The present uses of acrylonitrile are overshadowed by the large potential demands of the synthetic fibers industry. Fibers containing acrylonitrile are now under development or nearing commercialization by at least four companies. Du Pont's Orlon, which is to be produced commercially starting this fall at an announced rate of 6 million pounds per year, is essentially polyacrylonitrile. The company's requirements for acrylonitrile three to four years hence have been judged to be 30-40 million pounds annually. Carbide & Carbon is marketing its Dynel fiber containing 60% vinyl chloride and 40% acrylonitrile at an estimated rate of 2 million pounds annually. Chemstrand Corp., a joint affiliate of American Viscose Corp. and Monsanto Chemical Co., is also working on synthetic fibers reportedly containing high proportions of acrylonitrile, as is Industrial Rayon Corp.

Despite the active interest in acrylonitrile it remains to be determined whether ethylene oxide will continue to be the acrylonitrile raw material. Development work on alternate syntheses for acrylonitrile has been carried on by several major chemical producers, and a route utilizing acetylene rather than ethylene oxide may be adopted as the basic raw material, either by American Cyanamid in its further plant extensions or by other producers who may choose to enter the field. Available evidence points toward a relatively favorable economic structure for the acetylene route. Other procedures involving direct reactions between olefins and ammonia have been investigated by several companies. However, these routes produce a number of undesired by-products which are relatively difficult to separate from the acrylonitrile.

POLYGLYCOLS

Derivatives of the polyglycols are finding a variety of growing outlets. As in the case of other derivatives, the polyglycols can be produced either from ethylene glycol or oxide. The term polyglycols is used herein to include diethylene and triethylene glycols, as well as the higher derivatives. Some are derived as by-products in manufacture of ethylene glycol, although present production appears considerably larger than might be obtained from this source.

Two of the largest glycol producers —Carbide & Carbon and Dow—dominate polyglycol manufacture. Carbide makes the full range of materials including the di-, tri-, and polyglycols. The latter group embraces the Polyethylene Glycols 200, 300, 400, and 600, which are liquids, and the Carbowaxes 1000, 1500, 1540, 4000, and 6000, which are semi-solids. Dow manufactures principally the di- and tri- forms of ethylene glycol, although it offers a series of higher propylene glycol compounds. Jefferson is now reported to be producing diethylene glycol commercially,[6] and Wyandotte is believed to be investigating synthesis of the polyglycols.[7] Total output of the polyethylene glycols is estimated to be 25 million pounds annually, requiring about the same amount of ethylene oxide.

Diethylene glycol along with dipropylene glycol finds use in moisture-set printing inks. The glycol is used to dissolve a resin which has only limited tolerance for water so that when the ink is moistened, the resin precipitates from the glycol-water solution. Inks of this type are relatively new but have already developed considerable volume in a field where new materials and procedures are not readily adopted. The moisture-set inks have a rather dull surface, unattractive for magazine printing, but well adapted for printing on containers where their odorless character and permanency places them at an advantage. It is estimated that the moisture-set inks consume about 2 million pounds annually of diethylene glycol. Air dehumidification plants also may be based upon di- and triethylene glycol, but consumption is limited to new installations and make-up of small losses in existing plants.

Diethylene glycol and triethylene glycol esters with fatty acids are used in surface-active agents and in plasticizers. Producers of these esters in-

clude Glyco Products Co., Inc., Kessler Chemical Co., and Emulsol Corp. Consumption for these uses is further discussed below.

Triethylene glycol also has found a substantial but unique market. It has been found that vaporization of the triethylene glycol into the atmosphere tends to have a germicidal effect which may be beneficial in reducing the incidence of virus infections among occupants of the area. Tests in major banks, industrial plants, and schools have revealed fewer virus infections among the persons occupying a treated area than among control samples.[12] The triethylene glycol is vaporized from special heaters or introduced into an air-conditioning system at a controlled rate so that condensation on cold windows or surfaces is not excessive. The Air Purification Service, Inc., has pioneered development of the system and has introduced a small unit for retail sale which vaporizes the glycol from an impregnated paper roll. It is believed that several thousand such units are currently being used, and that triethylene glycol consumption already approximates 400,000 pounds annually.

In contrast with the reported results obtained in some of the controlled tests, it has been stated by a representative of the Federal Security Agency that "To date, beneficial effects have not been reported except under carefully maintained and favorable living conditions in which the person's activities are limited and supervised, and which do not simulate normal living conditions." The American Medical Association has stated that results to date do not justify using glycol vaporizers in schools, offices, and theatres, and that there is insufficient evidence to claim that infectious diseases can be eliminated by glycol vapors. However, the groups most closely connected with this development have expressed optimism, and are anticipating use of substantially increased volumes of triethylene glycol.

An important market for the polyglycols higher than triethylene glycol is as synthetic lubricants. Carbide & Carbon has developed and is marketing these materials under its Prestone and Ucon trade-marks for the automotive and industrial markets, respectively. Test marketing of the Prestone lubricants in selected areas has been carried out for the past few years, but as yet the company has not chosen to make it nationwide. The principal advantage of the Prestone lubricants is their clean-burning, so that no carbonaceous deposits are formed in the engine. It is reported that oil changes are required only every 15,000 miles, so that the long life may offset the high price of 75¢ per quart. The Ucon lubricants, which are also condensation products of ethylene oxide and propylene oxide, find a wide variety of industrial applications. Since they are clean-burning, they are used in tube-drawing and other metal-working operations so the oil-film can later be removed by burning. Considerable amounts are also used as textile lubricants since selected members of the series are water-soluble and can be removed readily by washing. The Ucons have favorable viscosity characteristics, low solvent action on rubber, and good stability, which favor their use in hydraulic brake systems and other hydraulically actuated machinery. It is estimated that the polyglycols of the Ucon and Prestone class consume about 8 million pounds of ethylene oxide per year.

TABLE 5
PRODUCTION OF POLYHYDRIC ALCOHOL ESTERS AND ETHERS
(Thousands of Pounds)

	Plasticizers[1]	*Surface Active Agents*	*Miscellaneous Esters*[1]	*Total*
1945	.....	.....	.....	.....
1946	6,774	10,181	2,403	19,358
1947	5,258	5,406	5,079	15,743
1948	11,195	9,097	1,267	21,559

Source: U. S. Tariff Commission.
[1] Includes some monohydric alcohol and glycerol esters.

Esters of the polyglycols with fatty acids form the basis for a wide series of compounds used as emulsifiers in both food and industrial applications. The polyoxyethylene compounds compete with the corresponding glyceryl esters, but have a cost advantage because of relatively higher efficiency. About 20 million pounds of such esters are now used as food emulsifiers, with polyoxyethylene compounds accounting for perhaps half of the total. The most important outlet is in white bread, where it is used to prolong softness and to impart a fresh "feel" to the bread. Hearings have been held before the Food and Drug Administration in an attempt to decide on incorporation of these esters in the bread "standards", although no decision has yet been reached. Atlas Powder Co. and Glyco Products have been the most active participants in the manufacture of polyoxyethylene compounds, although a number of smaller companies produce the same materials. If a favorable decision is reached by the Food and Drug Administration concerning adoption of the polyoxyethylene compounds, growth in this area should be stimulated. Use of the esters as emulsifiers in ice cream, candy, food flavors, and in other baked goods may also be widened. Consumption of ethylene oxide for this use is estimated at about 6 million pounds per year at present.

The production of polyhydric alcohol esters and ethers used in plasticizers, surface-active agents, and in miscellaneous applications is summarized in Table 5. These compounds may be esters of di-, tri-, or polyglycols with one of a number of fatty acids. As illustrated, the predominant use of these compounds is in plasticizers, although the field of surface-active agents is also important. As plasticizers, these derivatives go primarily into cellulosics, including nitrocellulose. Incompatability with some vinyl resins limit their general-purpose usefulness. The surface-active agents include compounds which are used to stabilize oil and water emulsions in insecticides, in resin-emulsion paints, and in lubricants such as may be used in wire drawing. Consumption of ethylene oxide for polyglycols in these categories is estimated at 9 million pounds per year.

NON-IONIC DETERGENTS

Non-ionic detergents represent one of the largest free markets for ethylene oxide. Such materials are usually made by combining ethylene oxide with an oil-soluble molecule. The latter group may be an alkyl phenol, fatty acid derivative, or long-chain mercaptan. In general, manufacturers of ethylene oxide have chosen not to participate in the non-ionic detergent market, although a recent report indicates that Carbide & Carbon is now entering this field with its newer Tergitol products. The largest non-ionic producers are believed to be General Aniline & Film Corp. and Rohm & Haas Co.

General Aniline manufactures a non-ionic for the consumer market which is distributed by B. T. Babbitt Co. under the trade name Glim. In addition it sells directly to the industrial market under its Antara trade-mark and to the textile market via General Dyestuff Corp. as Igepal. The materials are derived from amyl phenol and ethylene oxide. Rohm & Haas produces and markets a series of non-ionics under its Triton trade name. These compounds are believed to be derived principally from octyl phenol and ethylene oxide. The company has centered its attention on materials for the industrial rather than the household market.

Other producers of non-ionics, Monsanto (Sterox), Atlas Powder (Renex), and Sharples Chemicals, Inc. (Nonic), while Armour & Co., Glyco Products, and Alrose Chemical Co., are in the field on a smaller scale. These materials are generally derived from ethylene oxide and either a fatty acid or a long-chain sulfur compound such as dodecyl mercaptan. Some of the smaller companies may utilize polyglycols rather than ethylene oxide because of the relatively simpler handling. It is estimated that the combined pro-

TABLE 6—PRODUCTION OF AMIDE TYPE SURFACE-ACTIVE AGENTS
(Thousands of pounds)

	Fatty Acid Amides of Aminoethyl-ethanolamine	*Fatty Acid Amides of Monoethanolamine*	*Fatty Acid Amides of Diethanolamine*	*Other*	*Total*
1945	132	195	....	1,430	1,757
1946	219	309	1,649	1,058	3,235
1947	256	302	2,060	2,712	5,330
1948	407	2,697	1,894	10,851	15,849

Source: U. S. Tariff Commission.

duction on non-ionics by all companies amounts to about 18-20 million pounds annually.

The non-ionic detergents have several unique characteristics which make them applicable for a number of special applications. First, because of their chemical character, the common types are nonsubstantive to wool, i.e., do not tend to enter into loose chemical lankages with the wool fibers. This property has made them particularly valuable in wool scouring, and this field now appears to account for a major portion of total usage.

Unlike other detergents, most nonionics are liquid products, necessitating a new approach to their retail distribution. Products such as Glim are packaged in containers which permit easy measurement of the correct amount for dishwashing. However, the concept of use of a small amount of a liquid detergent has been difficult to cultivate. Cost has also been a drawback, and poor foaming has necessitated formulation with other costly ingredients.

Considerable importance was attached a few years ago to possible use of non-ionics as builders for the more common alkyl aryl sulfonate detergents. Tests revealed a considerable increase in washing efficiency when a relatively small amount of a non-ionic compound was added to the detergent. Because of cost considerations, however, this practice has apparently never been adopted by industry. Phosphate builders and carboxymethylcellulose have played a much more important role as detergent additives. Most of growth in non-ionics is hence expected to be for industrial uses such as wool scouring and in products for household use where the non-ionic is the principal ingredient.

ALKYLOLAMINES

Although use of ethylene oxide in manufacture of alkylolamines is somewhat smaller than in the other principal derivatives, this outlet has demonstrated a substantial rate of growth during the past five years. The three principal compounds in this group are mono-, di-, and triethanolamines, all obtained by reaction of ethylene oxide and ammonia. Carbide & Carbon and Dow have been the two largest factors in the field, both using captive sources of ethylene oxide. Wyandotte has also investigated the manufacture of ethanolamines[7] and it is reported that Jefferson now is actively considering production of these compounds.[8] Since the field is dominated by a relatively small number of producers, however, accurate data on production and end uses are not readily available, so that the following figures are only rough approximations.

Total consumption of ethylene oxide for the ethanolamines is estimated to be of the order of 21 million pounds annually. This quantity leads to about 25 million pounds of ethanolamines, distributed as follows:

	Million Pounds
Mono	8.5
Di	3.5
Tri	13.0
	25

Principal use of the ethanolamines appears to be in the field of surface-active agents, especially detergents. In most instances, the ethanolamines constitute a portion of the hydrophilic end of the molecule which usually contains a fatty acid or fatty alcohol.

U. S. Tariff Commission statistics relating to production of amide surface-active agents are shown in Table 6. Production of acid amides based on monoethanolamine is shown as about 2.7 million pounds for 1948. If coconut oil acid is taken as the basis, this output is equivalent to 700,000 pounds of monoethanolamine, or 500,000 pounds of ethylene oxide. The diethanolamine equivalent of the indicated production of the corresponding acid amides is also 700,000 pounds, or 600,000 pounds of ethylene oxide. Undoubtedly an additional quantity of ethylene oxide consumption is reflected in the figure for production of "Other" amide surface-active agents. It is of interest therefore to note a recent estimate[9] that production of all alkylolamides amounts to 10 million pounds annually. Taking this figure as a basis, it is estimated that consumption of monoethanolamine for surface-active agents is about 1,500,000 pounds, and that the use of diethanolamine is about the same.

The fatty acid amide-type surface-active agents are one of the oldest types used in the United States. The Igepont detergents of General Aniline and Film are of this class, and several other companies including Alrose, Onyx Oil & Chemical Co., Nopco Chemical Co., and Warwick Chemical Div. of Sun Chemical Co. also produce similar compounds. Use of these materials has been restricted by relatively high price.

An interesting example of this competitive disadvantage for the ethanolamine-type detergents is Lever Bros.' Breeze. This material, understood to be an ethanolamine derivative with other materials, was introduced as a light-duty household detergent, but it has now been largely replaced by Surf, which is an alkyl aryl sulfonate type.

Other than their use in detergents, mono- and diethanolamine find one other important outlet in gas scrubbing to remove acidic constituents in a gas mixture. The Girdler Corp. has promoted use of this scrubbing medium to remove such materials as hydrogen sulfide and carbon dioxide from many gas sources. Use of an ethanolamine is important as it permits recovery of the acidic constituent by desorption from the solution. About 1.6 million pounds of ethanolamine is used for this purpose annually.

Appreciable quantities of diethanolamine are believed to be used in the manufacture of morpholine. Carbide & Carbon is the only major producer of this material which is widely used as an emulsifier. Morpholine is unique among such products in that its evaporation rate is near that of water. It is therefore used in self-polishing floor waxes, where its controlled concentration gives a smooth surface by uniform coalescence of wax particles. It is estimated that this market accounts for use of 2.5 million pounds of diethanolamine annually. Diethanolamine is also used directly in soap-based shampoos to aid emulsification and prevent redeposition of dirt.

Triethanolamine soaps are also widely used as general emulsifying agents. Virtually all shampoos, including Drene and Prell produced by Procter & Gamble Co., incorporate triethanolamine. Shaving creams and cosmetics also represent significant markets. Use of triethanolamine is also increasing in the form of its lauryl sulfate salt, which is understood to be used in Procter & Gamble's Joy. This new product is a liquid detergent designed particularly for dishwashing. Another multi-million pound usage for triethanolamine is to form liquid 2,4-D salts. The total triethanolamine market is judged to be of the order of 13 million pounds annually.

OTHER USES

Ethylene oxide finds use in a number of specialty-type products which have not achieved as large volume as the derivatives already mentioned. Important examples are the glycol ethers marketed by Carbide & Carbon under the trade names Cellosolve and Carbi-

(Turn to page 148)

RECENT DEVELOPMENTS FROM THE A&S PACKAGING LABORATORY

Expendable Pallets — Palletized shipments of A&S bags lower your handling costs, minimize storage space.

STA-STAK Bag—Creped outer wall takes skid and slip out of stacking. Greater resiliency, easier handling.

SHUR-CLOSE—Ingenious bag valve assures less dust when packing—less sifting when packed —prevents waste.

PLASTO-PAK Bags—Polyethylene lined, moisture-proof protection for hygroscopic materials with exclusive "Electro-Seal" bottom closure.

SUPER GLOSS Flour Bag—Toughest of flour bags is bright white with brilliant inks to provide sparkling, appealing shelf packages.

ARK-TONE Printing—Sharp, clear color process combines perfect reproduction and brightness for consumer packages.

HI-TONE Printing—Strong, deep colors for sugar, salt, rice and similar bags.

PRESSUR-PAK Bale — Bags are packed under pressure. Saves 50% of customers' space allotted to storage.

ARKELL and SMITHS

CANAJOHARIE, N. Y. • WELLSBURG, W. VA. • MOBILE, ALA.

ARKELL & SMITHS 90 YEARS OF KNOW HOW THE OLDEST NAME IN PAPER BAGS

THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

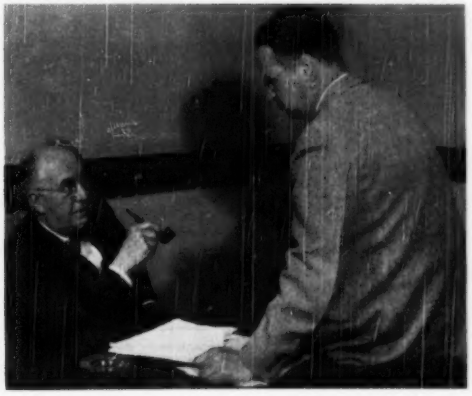
PEOPLE

ROBERT L. TAYLOR has resigned as editor of Chemical Industries to become executive vice-president of the Manufacturing Chemists' Association. He will take up his new duties Oct. 1 and will make his headquarters in N. Y.

WILLIAM M. RAND, president, Monsanto Chemical Co., who will receive the Society of Chemical Industry's Chemical Industry Medal.

ARTHUR E. BROOKS, appointed manager of U. S. Rubber Co.'s general laboratories at Passaic, N. J. He has been assistant to the director of research and development since 1947.

GEORGE M. POWELL, III (l), Hyatt Award winner, with John W. Snyder, Secy. of Treasury (center), and W. Kaempfert, N. Y. Times.



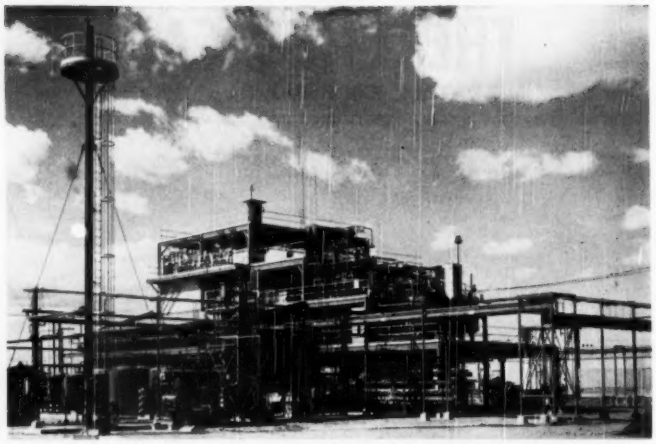
B. T. BUSH (l), president, Bush Aromatics, newly acquired by Dow, and ERNEST BRIGGS, Jr., now aromatic chemical sales manager.

DOW'S METHIONINE

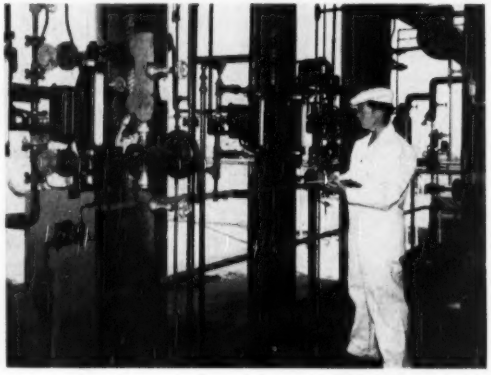
New plant in California makes amino acid for feed and pharmaceuticals.

The Dow Chemical Co. has recently put into operation the first large-scale plant for the production of dl-methionine at Pittsburg, Cal. The plant produces two grades of material, the pharmaceutical grade assaying about 99% purity and the feed grade, only slightly less pure. The feed grade is ground for easy blending in poultry and animal feeds while the pharmaceutical grade is marketed as a white, free-flowing crystal.

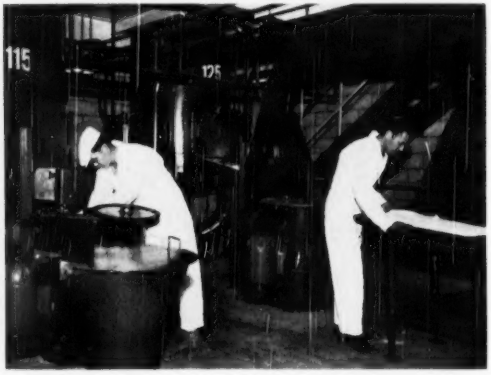
The process is extremely complex, requiring careful control and supervision of each step to maintain purity.



dl-METHIONINE plant built and operated by the Great Western Division of The Dow Chemical Co. at Pittsburg, Cal. Odorous gases are burned in the flare tower, left foreground.

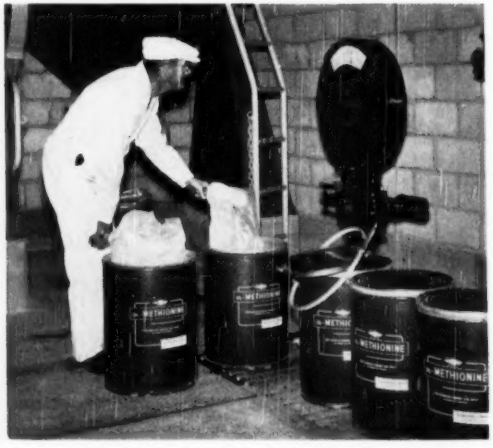


VISUAL CHECK of certain steps supplements centralized automatic control. Operator checks flow meters on distillation columns.



PHARMACEUTICAL and feed-grade dl-methionine are made on parallel finishing lines. Here crystalline material is centrifuged.

AFTER CENTRIFUGING, crystals are further dried in vacuum ovens. Feed-grade material is then ground to facilitate blending.



FINISHED PRODUCT is packed in 50 lb. containers. Air entering crystallizing and packaging rooms is filtered to reduce dust.

HIGHLY REACTIVE PHOSPHORIC ANHYDRIDE...

another VERSATILE VICTOR CHEMICAL

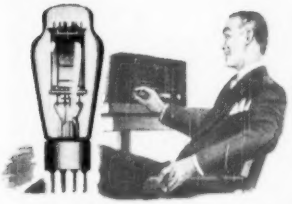
The properties of Victor phosphoric anhydride make it useful in many manufacturing processes. The following applications are typical and show the variety of uses which have been developed:

- ⟶ **GAS DRYING AGENT**
- ⟶ **CATALYST**
- ⟶ **REAGENT IN METHYL METHACRYLATE RESINS**
- ⟶ **ORGANIC PHOSPHATES**

If you are looking for ways to increase efficiency and reduce production costs, why not consider the application of Victor phosphoric anhydride? Write today for quotations, technical data, or samples.

Typical Reactions of Victor Phosphoric Anhydride

$$RCOOH + R'OH + P_2O_5 \rightarrow RCOOR' + 2HPO_3$$
$$R_2O + P_2O_5 \rightarrow 2RPO_3$$
$$3R_2O + P_2O_5 \rightarrow R_3PO_4$$
$$3ROH + P_2O_5 \rightarrow RHPO_4 + RH_2PO_4$$



GAS DRYING AGENT—RADIO TUBES

CATALYST—ASPHALT IN IRRIGATION DITCHES

ORGANIC PHOSPHATES—INSECTICIDES

REAGENT IN METHYL METHACRYLATE RESINS

VICTOR CHEMICAL WORKS

141 WEST JACKSON BOULEVARD • CHICAGO 4, ILLINOIS

A. R. Maas Chemical Co., Division

4570 Ardine Street, South Gate, California

NEW ALCOA research building at East St. Louis, Illinois. Development laboratory in background is equipped for pilot-plant operation.

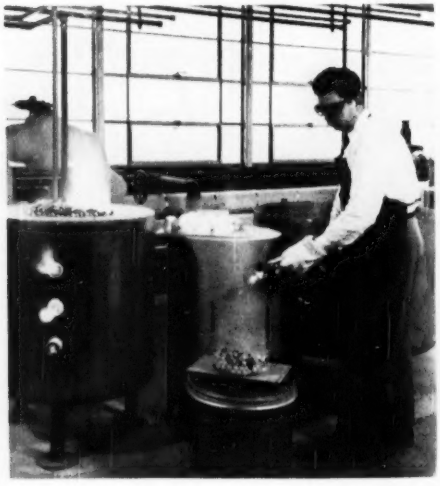
NEW ALCOA LAB

New laboratory devoted to development of chemicals from bauxite.

The Aluminum Co. of America has recently opened a new three-story laboratory at East St. Louis, Ill., for the development and improvement of chemicals derived from bauxite. The unit replaces older accommodations at the nearby plant of Aluminum Ore Co., subsidiary of Alcoa. Basically, the chemicals manufactured by the Aluminum Ore Co. are a variety of aluminas and fluorides in different forms and grades.

The new lab, adjacent to the company's pilot-plant building, is provided with an analytical laboratory, hoods and furnace rooms, and a special furnace room for modified Curtis convertors—high-temperature ceramic furnaces. The building is air-conditioned, but the furnace rooms are separately ventilated.

REPRESENTATIVE LAB. Building is air-conditioned, but about 45% of the outside area is devoted to window space to provide natural lighting.



EXPERIMENTAL FURNACE for the conversion of aluminum oxide to tabular alumina by heating to near the fusion point.

LAB where investigations are conducted on the use of hydrated aluminas as reinforcing pigments in the compounding of rubber and plastics.

Heyden

FORMIC ACID *and* SODIUM FORMATE

FORMIC ACID (90% and 85%)

Available in 500 lb. stainless steel drums or 125 lb. carboys. For use in:

Dyeing Operations
Textile Finishing
Leather Tanning
Rubber Manufacture
Paper Treatment
Metal Plating
Souring (laundries)
Intermediates for drugs, perfumes, formates, etc.

HEYDEN SODIUM FORMATE

A neutral and colorless crystalline powder which gives a clear solution in water and is especially suitable for use in the production of water-resistant wallpapers, in textile dyeing, in leather tanning and in a variety of other uses.

SHIPPED IN 300 LB. WATER-PROOFED FIBER DRUMS.

Samples and technical data sent promptly upon request on company letterhead.

SERVING INDUSTRY THROUGH FINER CHEMICALS

FINE HEYDEN CHEMICALS

Benzaldehyde • Benzoates • Benzyl Chloride
Bromides • Chlorinated Aromatics
Creosotes • Formaldehyde • Formic Acid
Glycerophosphates • Guaiacols
Hexamethylenetetramine • Medicinal Colloids
Methylene Disalicylic Acid • Paraformaldehyde
Parahydroxybenzoates • Penicillin • Pentaerythritols
Propyl Gallate • Quadrafos • Resorcinol
Salicylates • Salicylic Acid • Streptomycin

HEYDEN
CHEMICAL CORPORATION
393 SEVENTH AVE., NEW YORK 1, N.Y.
CHICAGO 6 - PHILADELPHIA 3 - SAN FRANCISCO 11
DETROIT 1 - RUMFORD 16, R.I.

VISITORS pass through the pilot plant where guides explain how small-scale equipment is used to set up processes which will later be installed in plants as production units.

GET-ACQUAINTED DAY

Public relations gesture gives Stamfordites chance to see Cyanamid's research set-up.

Stamford Research Laboratories, where basic laboratory work is carried on for the American Cyanamid Co., recently held an open house to acquaint the townspeople of Stamford with its activities. The laboratories have been in operation for over ten years, but this was the first time they have been open to the public.

Families and friends of the employees were conducted on a guided tour of the labs and pilot plant. Of especial interest were the facilities for research in nitrogen compounds, e.g., urea and melamine resins and acrylonitrile; flotation agents; and various textile treating compounds.

TRUNK COMPARTMENT of each gasoline test car holds 10 auxiliary fuel tanks. Six are for reference fuels and 4 are for test fuels. Driver can draw from any of the tanks.

TEN-TANKED AUTOS

Cars equipped with ten fuel tanks and several auxiliary indicators aid fuel testing.

The Du Pont Co. now has in operation three new gasoline testing cars specially equipped for determining octane ratings of motor fuels under road conditions.

A battery of pushbuttons on the instrument panels permit the drivers to draw gasoline from any of ten tanks. Other instruments show manifold vacuum, engine speed, back pressure of the exhaust, and spark advance. Drivers can advance or retard spark.

Our shipping system saves you headaches

● If your liquid storage facilities are limited, you have an *extra* reason for ordering your Coal Chemicals from United States Steel. Through careful attention to shipping dates, we make every effort to put the cars of U·S·S Coal Chemicals you order on your tracks the day you specify.

Ample facilities make such service possible . . . nine plants produce U·S·S Coal Chemicals . . . five sales offices give prompt attention to your orders.

U. S. Steel offers you a complete line of Coal Chemicals—Benzol, Toluol, Xylol, Phenol, Cresol, Cresylic Acid, Naphthalene, Creosote Oil, Pyridine, Picolines and Ammonium Sulphate. For additional information, get in touch with our nearest sales office.

COAL CHEMICAL SALES DIVISION
UNITED STATES STEEL CORPORATION SUBSIDIARIES
71 Broadway, New York 6, N. Y.
208 South La Salle St., Chicago 90, Ill. 1509 Terminal Tower, Cleveland 13, Ohio
Brown-Marx Building, Birmingham 2, Ala. 25 Beale St., San Francisco 5, Calif.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

COAL CHEMICALS

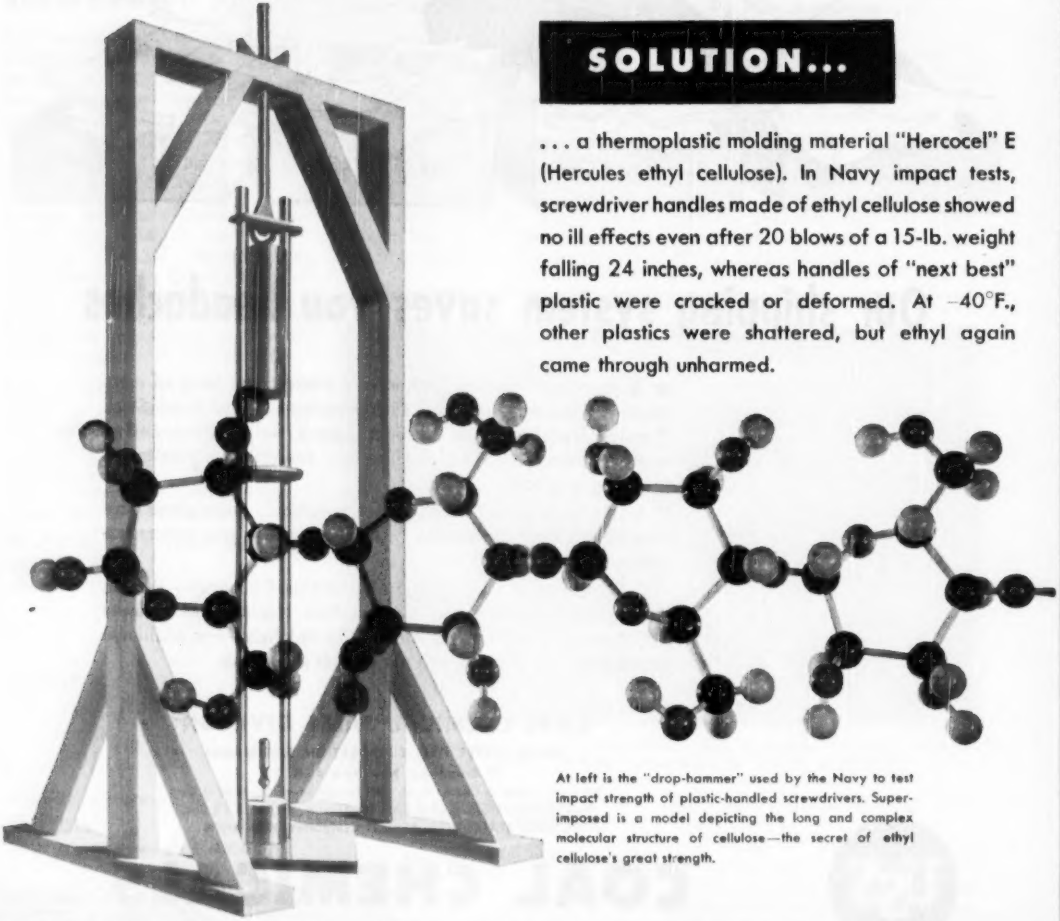
UNITED STATES STEEL

PROBLEM...

. . . to find a more durable material for tool handles . . . which would retain its original form and finish under the severest use conditions; not crack or shatter, even if mistreated; and not become loose when subjected to wide variations of temperature.

SOLUTION...

. . . a thermoplastic molding material "Hercocel" E (Hercules ethyl cellulose). In Navy impact tests, screwdriver handles made of ethyl cellulose showed no ill effects even after 20 blows of a 15-lb. weight falling 24 inches, whereas handles of "next best" plastic were cracked or deformed. At −40°F., other plastics were shattered, but ethyl again came through unharmed.



At left is the "drop-hammer" used by the Navy to test impact strength of plastic-handled screwdrivers. Superimposed is a model depicting the long and complex molecular structure of cellulose—the secret of ethyl cellulose's great strength.

HERCULES SYNTHETIC RESINS · CELLULOSE PRODUCTS · TERPENE CHEMICALS

TOPS IN TOUGHNESS! Many process industries think of Hercules ethyl cellulose first when they want strength and economy. In one form or another, this versatile cellulosic material has successfully handled many other tough product problems.

Ethyl cellulose flake is used to strengthen phonograph records. Solutions of this material provide durable, quick-setting plastic peel to protect hardware; weather-resistant cable coatings; marproof furniture lacquer; heat-sealing finishes, and laminating adhesives for paper and paperboard. Printing inks of many types also owe their durability and quick dry to ethyl cellulose.

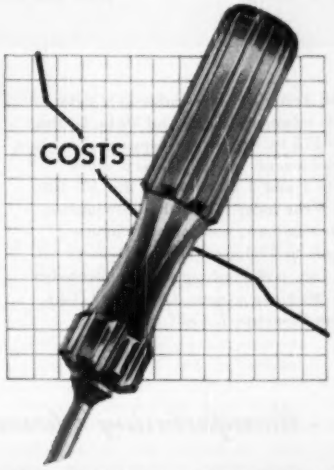
Whether your problem concerns plastics or some other material where the toughness of the cellulose chain could be useful, Hercules welcomes the opportunity of placing its long experience in cellulose chemistry at your disposal.

HERCULES POWDER COMPANY 992 Market Street, Wilmington, Delaware
Sales Offices in Principal Cities

"DRESINOL," "HERCOCEL," "HERCOFLEX" AND "VINSOL" ARE HERCULES TRADE-MARKS

RESULT...

. . . colorful, permanently attractive tool handles that are not only super-tough, but non-conductive and economical to mold or fabricate. Their use by the automotive and other industries has meant a marked decrease in replacement costs.



Hot Lacquer is Hot News

Wearing hot-lacquer coats, a group of new and old cars is providing Hercules with a mobile proving ground for the relatively new technique of spraying high-solids lacquers at elevated temperatures. Furniture manufacturers also are rapidly adopting the process.

Heat, rather than high solvent content, makes the lacquer fluid enough for spraying. Less solvent and higher solids mean thicker films when dried, fewer coats required, increased production capacity, and minimum rubbing.

Write for folder, "The Case For The Hot-Lacquer Process".

The Case for Casein

Supreme among water adhesives because of their water resistance and dry bond strength, casein glues are finding added uses in the packaging industry. One of the oldest applications is for affixing beer bottle labels. The latest important use is for gluing the paperboard beer cases themselves. Here, a bond is provided which is strong enough to withstand handling and shipping yet easily released when the case is opened. Hercules is a major supplier of casein to the adhesives industry.

New "Hercoflex" for Vinyls

"Hercoflex" 290 (octyl decyl adipate) is the third in a series of vinyl plasticizers to be announced within recent months by Hercules. Possessing the low volatility usually restricted to phthalates, this adipate-based ester contributes exceptional low-temperature properties and improved "drape" to vinyl film and sheeting.

Rubber Latex Extenders

Hercules Dresinols®—a series of resin emulsions—find increasing use as extenders and modifiers for synthetic and natural rubber latices. They offer a wide variety of film properties, high water resistance, and other typical resinous characteristics. Their use is indicated in many industries where water-dispersible resins are desired.

More Durable Concrete

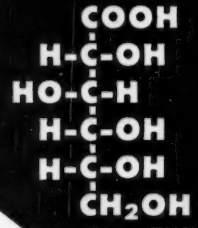
Hercules neutralized Vinsol® Resin (NVX) is widely used for producing air-entrained concrete . . . a concrete which is more durable under freezing and thawing conditions, is more uniform, more workable, and has improved surface texture. It can be interground with cement at the mills or added to the concrete mix at the mixer.

ROSIN AND ROSIN DERIVATIVES · CHLORINATED PRODUCTS · AND OTHER CHEMICAL MATERIALS FOR INDUSTRY

GC50-4

IF YOU... Need a Mild, Poly-hydroxy Mono-carboxylic Acid

SPECIFY PFIZER GLUCONIC ACID



PROPERTIES and USES

Molecular Weight — 196.16

Appearance — Yellowish liquid

Specific Gravity of Solution @ 25°C — 1.24

Solubility in Organic Solvents — Low

A mild acid; low corrosion rate on metal; non-toxic, easily assimilated, forms soluble salts; non-tendering to fabrics.

A sequestering agent and acid for —
- Textile dyeing
- Leather dyeing
- Acidizing oil wells
- Catalyst for Melamine resins

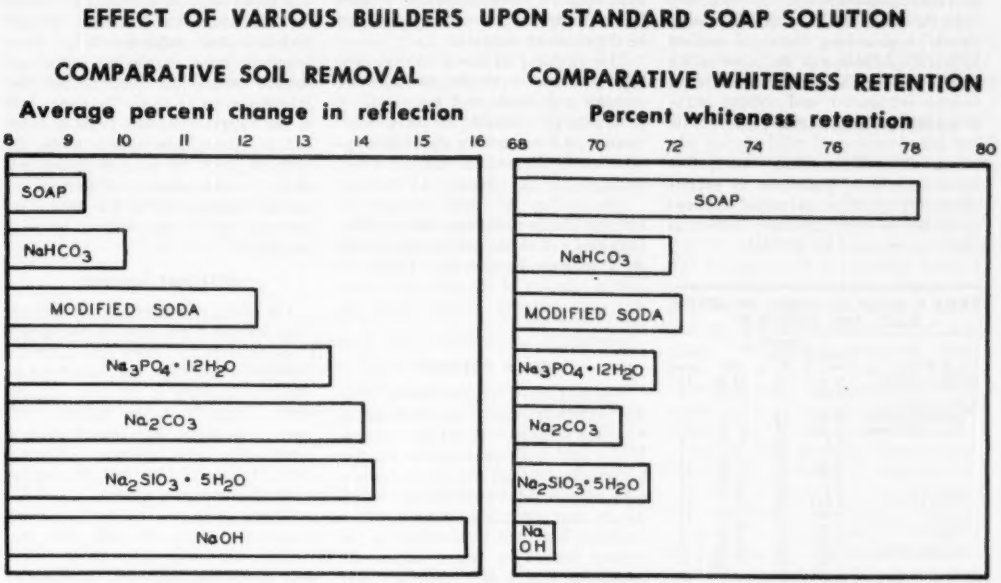
A metal cleaner with a low corrosion rate for —
- Electro-pickling
- Pickling baths
- Acidic type cleaners

Easily assimilated for —
- Food and Pharmaceutical Use

Pfizer Gluconic Acid Technical is available as a light yellow 50% aqueous solution in 5, 25 and 50 lb. bottles, 100-lb. carboys and 575 lb. drums. Its companion product, Pfizer Glucono-Delta-Lactone, is available as a white crystalline powder in 1 and 5 lb. canisters, 25, 50, 100 and 250 lb. drums. Write today for further information and samples of these non-toxic, non-corrosive mono-carboxylic compounds to Technical Service Department, Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

PFIZER

Manufacturing Chemists for Over 100 Years



ELECTROLYTIC BUILDERS increase soil removal capacity of a given soap solution, but reduce its ability to keep soil suspended, as this graph based on data of Vaughn and Vittone[21] indicates. These opposite effects emphasize necessity for care in selecting builders or builder combinations to get optimum cleaning.

How Sodium Salts Work in Detergents

by WM. W. NIVEN, JR. and HOWARD GADBERRY
Midwest Research Institute, Kansas City, Missouri

YOU USE BUILDERS if you make detergents for laundries, household use, restaurants, dairies, beverage bottlers. Check your product formulas against these in current use. See what builders go into them, how they are selected, how they work.

ANY material which either possesses detergent powers of its own or enhances the detergent powers of another material may properly be considered a detergent. Many inorganic alkali salts, by this definition, are true detergents.

From a practical standpoint, the cationic constituent of alkali salt detergents is limited to sodium. Lithium, potassium, and other alkali salts usually are excluded from practical applications because of cost. Therefore, the present discussion will be limited, with two exceptions, to various inorganic sodium salts of interest as detergents. One exception is sodium hydroxide; the other, sodium carboxymethyl cellulose (CMC) which, in its detergent characteristics, is intermediate between truly inorganic salts and the sodium salts of fatty acids.

The most extensively used sodium salt detergents are the salts of weak inorganic acids and include the carbonate, sesquicarbonate, metasilicate, orthosilicate, sesquisilicate, "water glasses" of various Na_2O/SiO_2 mol ratios (from 1:2 to 1:4), orthophosphate, pyrophosphate, tripolyphosphate, tetraphosphate, hexametaphosphate, and tetraborate. This class of materials also includes modified soda, a physical mixture of the carbonate and bicarbonate.

An additional sodium salt of significance is sodium sulfate, present as a by-product in sulfate and sulfonate synthetic detergents but nevertheless having detergent powers.

CHEMICAL PROPERTIES

One of the most significant chemical characteristics of sodium hydroxide and of the sodium salts of weak inorganic acids, from the standpoint of detergency, is their ability to form alkaline aqueous solutions, the latter compounds acting in this way by

hydrolysis. The pH values for aqueous solutions of several of these materials, as well as the effects of concentration and temperature on the pH of these solutions are shown in a general way in Table I. Solutions of sodium orthosilicate, $2Na_2O{\cdot}SiO_2$, give pH values closely approaching those of sodium hydroxide solutions of the same solute concentration. At the other extreme, sodium tetraborate and sodium tetraphosphate are hydrolyzed very little and give solutions of relatively low pH value. As will be shown later, this characteristic of hydrolysis is particularly important in detergent applications where high alkalinity either is required or must be avoided.

TABLE I—pH OF SOLUTIONS OF SODIUM SALTS AND HYDROXIDE

Material	*Solution Conc., %*	*Temperature °C.*	*pH*	*Reference*
Sodium hydroxide	0.033	25	11.85	17
	0.66	25	12.8	17
Sodium silicates				
$2Na_2SiO_3$(ortho)	0.66	25	12.6	17
$Na_2O{\cdot}SiO_2$(meta)	0.033	25	11.2	17
	0.1	16	11.5	9
	0.1	85	9.7	9
	0.66	25	11.9	17
	0.8	16	12.4	9
	0.8	85	10.6	9
$Na_2O{\cdot}1{\cdot}58\ SiO_2$	0.033	25	10.7	17
	0.66	25	11.5	17
$Na_2O{\cdot}2{\cdot}1\ SiO_2$	1.25	16	11.6	9
	1.25	85	10.1	9
$Na_2O{\cdot}3{\cdot}4\ SiO_2$	1.25	16	10.85	9
	1.25	85	9.65	9
	0.156	16	10.1	9
	0.156	85	8.6	9
$Na_2O{\cdot}3{\cdot}86\ SiO_2$	0.033	25	10.1	17
	0.66	25	10.4	17
Trisodium phosphate	0.033	25	10.8	17
	0.66	25	11.7	17
Tetrasodium pyrophosphate	1.0	..	10.2	2
Sodium tripolyphosphate	1.0	..	9.8	13
Sodium tetraphosphate	0.50	25	8.7	15
Sodium carbonate	0.033	25	10.65	17
	0.66	25	11.2	17
	1.0	16	11.1	9
	1.0	85	10.0	9
Modified soda	0.033	25	10.0	17
	0.66	25	10.0	17
Sodium tetraborate	0.033	25	9.35	17
	0.66	25	9.2	17

A second significant chemical characteristic of several of these salts is their ability either to remove or to sequester calcium and magnesium "hardness" in water. Soda ash and sodium silicates may precipitate calcium to some extent as carbonate or silicate. Trisodium phosphate precipitates calcium and magnesium phosphate sludges. Tetrasodium pyrophosphate ($Na_4P_2O_7$), sodium hexametaphosphate ($(NaPO_3)_6$), and sodium tripolyphosphate ($Na_5P_3O_{10}$) are effective water conditioners; however, rather than forming precipitates, they sequester the calcium or magnesium ions into soluble complex ions from which the calcium or magnesium may not be precipitated by other materials. The ability to sequester "hardness" extends to sodium carboxymethyl cellulose,[22] although to a lesser degree. This characteristic of certain compounds is important in detergency in preventing the formation of insoluble calcium or magnesium soaps, either when the salts are used in conjunction with soap or when soaps are formed by the neutralization of fatty acid soil in the cleaning process.

The solubility of many natural proteins in aqueous electrolyte solutions through peptization and the solubility of denatured proteins in alkali solutions point the way to a significant application of the sodium salts as detergents.

The ability of those compounds forming alkaline solutions to neutralize fatty acid soil is particularly significant in detergency because this results in both a solution of the soil and a new detergent material formed from the soil.

SURFACE ACTIVITY

It is a common but misleading practice to consider detergent power somewhat synonymous with surface activity. It is a further all-too-common practice to consider that several of the sodium salts possess significant surface activities in their own right. Actually, these materials have but little effect on the surface tension of water or on the interfacial tension between water and an *inert* organic material. In turn, they are not in themselves significant dispersing or emulsifying agents for soils in the sense that they reduce free surface energies and, thus, the mechanical energies required to attain dispersion. On the other hand, all of the compounds whose solutions are above a pH of about 10 have an indirect but pronounced effect on surface activity in the presence of fatty acids or easily saponifiable material. Thus, their ability to produce surface-active soaps from the very soil they are deterging may have a very pronounced effect on their powers as detergents. This effect is quite remarkably evident in the case of spontaneous emulsification of fatty acids by alkali solutions, reported by Kling and Schwerdtner[10].

Solutions of all the above sodium compounds, except the silicates, show no significant foaming tendencies at practical concentrations (about 1 per cent). Stericker[20] has reported the foaming powers of sodium silicates of several Na_2O/SiO_2 ratios. In the presence of small amounts of fatty acids, solutions of the alkaline sodium compounds may show pronounced foaming, again indirectly by formation of soaps.

The stabilizing power of many of the sodium compounds for dispersed particles or oil droplets is direct and quite pronounced. Fall[5], Baker[1], and Carter[3] have reported the suspending powers of several alkaline sodium salts and sodium hydroxide for various inert dispersed particles. In general, there is a rather narrow optimum pH range for maximum stabilization. Sodium carbonate and modified soda are at or below the lower part of the range, and sodium orthosilicate and sodium hydroxide are at or above the upper part of the range. The less basic silicates and the phosphates appear to be the best stabilizers for inert dispersed material. In the presence of fatty acids, the stabilizing power of the more alkaline materials is beneficiated by soap formation[18].

DETERGENT BUILDERS

The most extensive use of the various sodium compounds in detergency is as builders for soaps and synthetic detergents. As such, they must not be considered simply as extenders or diluents. Properly chosen builders with soap or synthetic detergent produce a combination with detergent efficiency definitely superior to that of soap or synthetic detergent alone.

When used as builders, sodium compounds exert not only the previously discussed independent detergent action but also exert pronounced effects on the properties and actions of the soap or synthetic detergent.

Of first importance is suppression of dissociation and hydrolysis of soaps by the presence of a builder in solution. This suppression is attributable primarily to the presence of additional sodium cations from the builder and, for the alkaline builders, to the maintence of a high hydroxyl ion concentration. The suppression of soap hydrolysis is in some cases so pronounced as to cause the built soap solution to show the characteristics of an unbuilt solution of unhydrolyzed synthetic detergent. In this connection it must be borne in mind, however, that hydrolysis of soap is suppressed only by those builders which maintain the hydroxyl ion concentration at some point above that of the unbuilt solution (above approximately pH 10.0-10.5). The importance of this point has been discussed in detail by Snell[17, 19].

The general effects of electrolyte builders on surface tension are an *increase* in the surface tension of soap solutions and a *decrease* in the surface tension of unhydrolyzed synthetic detergents. On the other hand, the general effect of these builders on interfacial tension is uniformly a decrease, for either soap or synthetic detergent solutions. A convincing explanation

of this apparent anomaly is still lacking. However, the increase brought about in the surface tension of soap solutions by electrolyte builders is sufficient that, in some laundry applications, the first suds solution is unbuilt so as not to inhibit its wetting power[7]. The effects of electrolytes on the surface activity of an unhydrolyzed synthetic detergent are shown in Table II, from the work of Harris[6] with dodecyl benzene sodium sulfonate. It is particularly significant that, by the use of builders, it is possible to use as little as 40 per cent as much of the surface-active agent to attain surface and interfacial tensions which are, in some cases, even lower than those of the unbuilt solutions.

TABLE II—EFFECT OF CATION UPON SURFACE AND INTERFACIAL TENSION OF DODECYL BENZENE SODIUM SULFONATE[6]

Builder	*Surface Tension*			*Interfacial Tension (Nujol)*		
	1.0% soln.	0.25% soln.	0.0625% soln.	1.0% soln.	0.25% soln.	0.0625% soln.
None	32.0	31.2	30.3	5.2	3.5	3.1
NaCl	28.4	29.7	31.6	2.5	2.5	3.5
Na_2SO_4	29.2	30.2	30.4	2.9	2.8	3.3
Na_2CO_3	28.5	30.3	30.9	2.7	3.6	5.1
$Na_4P_2O_7$	29.4	30.6	34.8	2.7	4.3	8.4

The effect of a particular electrolyte builder on the ability of soap to remove soil from, say, fabric is quite remarkably different than its effect on the prevention of redeposition of the soil. The graph on page 61, taken from the work of Vaughn and Vittone[21], shows the comparative soil removal capacities of several built soap solutions under one particular set of conditions. These results were obtained from tests with artificially-soiled cotton swatches washed with detergent solutions containing 0.1 per cent soap and a 2:1 soap:builder ratio. The pronounced enhancement of the soil removal capacity of the soap by electrolyte builder is quite contradistinctive to the pronounced impediment of the power of the soap to prevent soil redeposition, also shown on the page 61 graph. This difference accentuates the necessity, when building soap solutions, to select those builders or builder combinations which most greatly aid in soil separation and, at the same time, least impede the soap's ability to prevent redeposition.

Sodium carboxymethyl cellulose's special function in preventing soil redeposition must be considered in this connection. Using as an example a sodium alkyl aryl sulfonate detergent whose whiteness retention power (ability to prevent soil redeposition) is approximately one-half that of a high-grade unbuilt laundry soap, Vaughn and Smith[22] have shown that the adding of 10 per cent sodium carboxymethyl cellulose to many combinations of detergent and alkaline electrolyte builder gives mixtures having whiteness retention powers equal to or greater than that of unbuilt soap. In this case, the sodium carboxymethyl cellulose not only overcomes the impeding action of the electrolyte builders but enhances the power of the synthetic detergent to prevent redeposition.

BUILDERS IN COMMERCIAL LAUNDERING

The preponderant use of soaps rather than synthetic detergents for commercial laundry work at the present time makes soap building of greatest interest in this field. However, there is no question but what the synthetic detergents are due to receive wider application in the future.

Prescription of a definite soap-builder formulation for commercial laundry work is difficult for many reasons. Influencing factors include:

1. Susceptibility of the fabrics to high alkalinity.
2. Nature and extent of soiling.
3. Hardness of the water.

Soap concentrations of 0.1-0.2 per cent and soap-builder ratios of 2:1 to 1:1 are commonly used. The choice of builder, which too often is established more by a "personal factor" than by accurate comparative data, may range from any one of the several alkaline builders to combinations of two or more builders. Many proprietary builder combinations, including special modified sodas, are on the market. Included in these combinations are such materials as:

1. Sodium carbonate and sodium silicate glass of low Na_2O/SiO_2 ratio.
2. Sodium silicates, sodium carbonate and tetrasodium pyrophosphate.
3. Sodium silicates, tetrasodium pyrophosphate and moderate amounts of organic material.

The number of *usable* combinations is almost unlimited and certain advantages for a particular application can be found for almost any of them.

An excellent graphical illustration of the large number of detergent-builder combinations that might be used for various applications in the system—alkyl aryl sulfonate—alkaline builder—CMC—is given by Figures 4-7 and 9-12 of the paper by Vaughn and Smith[22].

BUILDERS FOR HOUSEHOLD USE

Packaged detergents for the home receive an extremely wide variety of uses, including laundering, dishwashing, floor scrubbing, metal cleaning, and the cleaning of painted surfaces. The buying trend is definitely toward proprietarily built materials which employ either soap or a synthetic detergent as the surface-active "base" material. The modern packaged detergents are a far cry from the home-built soap and lye combinations which prevailed to an appreciable extent as recently as 15 or 20 years ago.

For several years the heavy-duty, built, packaged household soap market has been dominated by a standard soap-and-builder combination which is marketed by substantially all major soap producers. These products, advertised principally for laundering, dishwashing, and household scrubbing, have this approximate composition:

Soap	56%
Tetrasodium pyrophosphate	6%
Sodium carbonate	12%
Sodium metasilicate	6%
Moisture and inert	20%
Total	100%

It is only within the last few years that the new, all purpose, hard-water synthetics for home laundry use have been developed to the point where they give detergency comparable to ordinary soap for the laundering of heavily soiled cottons. This improvement is almost entirely attributable to the use of the proper alkaline builders. A typical composition of such a product:

Sodium alcohol sulphate	25%
Tetrasodium pyrophosphate	12%
Sodium tripolyphosphate	40%
Sodium CMC	5%
Moisture and sodium sulfate	18%
Total	100%

In this type of household detergent, the cleansing power has been found to be almost proportional to the sodium polyphosphate content and only enough wetting agent is required to give satisfactory lowering of the surface tension and provide the running suds which the housewife considers one of the criteria of a satisfactory washing

product. The sudsing properties of the detergent selected must be carefully balanced with the builder mixture in such a way that, when the housewife obtains a standing suds in the washing machine, the concentration of the detergent in the wash water is sufficient to give good cleansing action. The sodium carboxymethyl cellulose reduces redeposition of suspended soil.

In some soft water areas, a comparatively simple built-soap of high soap content has proven very satisfactory and has met with widespread consumer acceptance. Products of this type are built with sodium carbonate and sodium metasilicate with this composition:

Soap	74%
Sodium carbonate	9%
Sodium metasilicate	7%
Moisture and inert	10%
Total	100%

HAND DISHWASHING COMPOUNDS

The requirements for an acceptable household product for hand dishwashing are:

1. Good wetting power for oily soil.
2. Excellent emulsifying power.
3. Good ability to disperse food particles.
4. Some water softening power.
5. Sufficient alkalinity to react with fatty acids and certain natural fats.

Most hand dishwashing is done at a temperature of 110 to 115°F. Therefore, the alkaline builders should be chosen to give their best performance in this temperature range, as well as at a pH which is non-irritating. In general, the phosphates, especially the polyphosphates, are preferred as the alkaline builders for these hand dishwashing compounds because of their greater building activity in the low-pH range.

Because they leave no residual film on glassware, synthetic detergents have been increasingly accepted until today they dominate the field of hand dishwashing. The alkyl aryl sulfonates are most widely used and generally carry with them 50 to 60 per cent of sodium sulfate which acts as a builder and gives performance almost equal to a 100 per cent surface active material. As compounded for household use, one very popular product of this type has the composition:

Sulfonated detergent	30%
Sodium hexametaphosphate	2%
Sodium sulfate	61%
Sodium chloride	6%
Moisture	1%
Total	100%

Another product which has received wide consumer acceptance is built with sodium bicarbonate as well as phosphates and has the composition:

Sulfated monoglyceride	33%
Tetrasodium pyrophosphate	2%
Sodium bicarbonate	1%
Sodium sulfate	64%
Total	100%

AUTOMATIC POWER DISHWASHING

The requirements for automatic power dishwashing, either in the home or in restaurants, are very different from those for hand dishwashing. Although the same soil must be dispersed, emulsified, and carried away, the temperature of operation is usually 140°F. or higher and a good deal of soil is removed by mechanical agitation of the water. Since deep-running suds in the dishwashing machine would cushion this agitation and impair soil removal, high-foaming synthetic detergents so frequently found in hand dishwashing compounds are almost never used. Soaps or synthetic detergents are employed only to the minor degree required to give proper lowering of interfacial tension. A powdered proprietary dishwashing compound which has been widely recommended by the manufacturers of household automatic dishwashers has the following composition:

Sodium hexametaphosphate	40%
Sodium metasilicate · 5 H_2O	40%
Trisodium phosphate · 12 H_2O	15%
Sodium hydroxide	5%
Total	100%

Hughes and Bernstein[8] tested various commercial compounds and proposed the following specifications for a superior product:

	Minimum	*Maximum*
Moisture	—	25%
Alkali as Na_2O	30%	45%
Phosphates as P_2O_5	20%	—
Silicates as SiO_2	8%	—
Carbonates as CO_2	—	20%
Insoluble	—	1%
Total of P_2O_5, SiO_2, CO_2	35%	—
Total of Na_2O, P_2O_5, SiO_2, and CO_2	70%	—

In laboratory tests[23] using a synthetic food soil, the alkaline mixture which gave the best cleansing and the lowest residual film on glassware comprised:

Sodium tetraphosphate	32.0%
Sodium metasilicate · 5 H_2O	40.0%
Sodium carbonate	28.0%
Total	100.0%

Recommended reading for research chemists...

CONCISE, INFORMATIVE LITERATURE ON ARMOUR'S

"Chemicals from Fats!"

Whether you make cosmetics or germicides, crayons or rust preventatives, synthetic detergents or printing inks, polishing waxes or paints, carbon papers or plasticizers . . . you'll want to know more about Armour's versatile "Chemicals from Fats."

Write for the following free booklets to see how these high molecular weight aliphatic chemicals can help you.

Armeens*—Fatty Amines

The Armeens, high molecular weight aliphatic amines having alkyl chain lengths of 8 to 18 carbon atoms, and their water-soluble acetate salts, the Armacs*, are used extensively as ore flotation reagents and also as a base for many of the new high potency quaternary salt germicides. Their many other uses include cationic emulsification, synthetic detergents, penetrants and repellents.

Armids*—Fatty Amides

The Armids are high molecular weight aliphatic amides having alkyl chain lengths of 8 to 18 carbon atoms. These high-melting, wax-like nitrogen containing chemicals are used in printing inks as "all weather" anti-scratch materials. Other uses include emulsion stabilizers and thickeners, dye solubilizers for carbon paper, anti-blocks for plastics, chemical synthesis.

Arquads*—Quaternary Ammonium Salts

The Arquads are Armour's alkyl trimethyl ammonium chloride chemicals—ranging from water soluble to oil soluble. They have excellent germicidal properties and surface active properties; are effective also as cationic textile softeners and ore flotation reagents. Other uses include anti-static polishes for waxes, detergents, and alkaline cleaning compounds.

ARMOUR *Chemical Division*

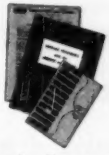
Armour and Company • 1355 West 31st Street • Chicago 9, Illinois

Ethomeens*—Ethomids*—Ethofats*

The Etho-chemicals are polyethylene glycol derivatives of fatty amines, fatty amides and fatty acids. These cationic and non-ionic chemicals have proven themselves particularly valuable as wetting agents, detergents, emulsifiers (and emulsion breakers), and as chemical intermediates.

The Chemistry of Fatty Amines

This twenty-page booklet gives detailed information on the fatty amines and includes sections on synthesis, saturated and unsaturated fatty amines, solubility, handling, quaternary ammonium salts, as well as on chemical coordination and substitution reactions, and cationic surface activity.



Technical Information Bulletins

Other informative bulletins are also available. Among them are: Bulletin #1B, "Armine Retarders and Anti-Scorching Agents"; Bulletin #2D, "Arneels as Plasticizers"; Bulletin #7E, "Sanitizing in the Frozen Fruit Concentrate Industry"; Bulletin #5F, "Compounding Detergents with Ethofat 242/25"; Bulletin #201, "Armid H.T. in Printing Ink"; Bulletin #202, "Armeens and Armacs as Cationic Emulsifiers"; Bulletin #203, "Armids as Mutual Solvents for Waxes and Plastics"; and Bulletin #204, "Armowax."

**Reg. Trademark U. S. Pat. Off*

MAIL THIS COUPON TODAY

Armour and Company
1355 West 31st Street
Chicago 9, Illinois

Please send me the booklets checked—

☐ Armeens ☐ Armids ☐ Arquads ☐ Etho-chemicals
☐ The Chemistry of Fatty Acids
☐ Technical Information Bulletins (specify) #_____

Name _____ Title _____

Firm Name _____

Address _____

City _____ Zone _____ State _____

All of these builders are selected to leave a clean draining water film on glassware, and include silicates which give to glassware a much-desired surface sparkle.

FLOOR CLEANERS

Among industrial detergent compositions, floor cleaners and soaps represent a large volume of consumption. Floors receive hard wear and are subject to abuse from dirt and water tracked on and ground in by the traffic. Their proper maintenance requires the selection of a cleaner designed specifically for floor cleaning use. While floors to be cleaned may range from fine marble and terrazzo to greasy shop floors, the requirements which the cleaner must be designed to meet are substantially the same. The maintenance staff desires maximum cleaning power with minimum effort, no deleterious effect on the floor, a cleaned floor which is bright and free from streaks or residue, and neither a slippery nor a gritty surface. Use of unbuilt soap solutions on concrete floors is undesirable since lime soaps are formed. However, solutions containing phosphates control this objection to some degree. A typical heavy-duty shop floor cleaner[11] is a highly alkaline solution with excellent dirt dispersing and oil emulsifying powers such as:

Low titre soap	10%
Sodium metasilicate	85%
Tetrasodium pyrophosphate	5%
Total	100%

On better floors such as marble or tile, the potash-oil soaps are most widely used and are built with soda ash or sodium polyphosphates. Typical mixtures contain:

Potash-soybean oil soap	13%
Pine oil	3%
Soda ash (58%)	8%
Sodium hexametaphosphate	6%
Water	70%
Total	100%

The product is a liquid soap concentrate which is diluted for use.

DAIRY DETERGENTS

Use of alkaline detergents to clean dairy equipment and milk containers is an excellent example of tailoring the properties of various alkalies to meet specific requirements of a definite type of soil under conditions where rigorous sanitation must be maintained. Cleaning milk pasteurizers and dirty milk bottles requires good wetting of the film of solid soil, emulsification of the fat, peptization of the casein,

for merely a 3¢ stamp

...Technical data sheets are available to you. Samples, too, if requested.

Add Cyanamid to your list of suppliers for these 4 products

1. AERO* PHTHALIC ANYHDRIDE

For use in the manufacture of phthalic alkyd resins, chemical plasticizers (phthalate esters), vat dyes and phthalocyanine pigments.

- Free-flowing, clean, white flakes
- Exceptionally free from color and odor-forming impurities

2. AERO* DOP

Di-2-Ethyl-hexyl Phthalate

The ideal plasticizer for use in vinyl resin films of all types and an excellent plasticizer for nitrocellulose and synthetic rubber, because of its:

- Low freezing point
- Light color
- Low vapor pressure
- Good compatibility
- Low brittle point

3. AERO* FUMARIC ACID

For use in the manufacture of coating resins—contributing importantly to color retention, chemical resistance, and drying speed. For use in plastics, laminating resins and printing inks—capable of reactions by condensation and addition polymerization, as this acid has the advantages of being highly functional.

- Free-flowing—easy to handle
- Non-hygroscopic

4. MALEIC ANHYDRIDE

For use in the manufacture of alkyd-type resins, pharmaceuticals, rubber and surface acting agents. A highly reactive industrial chemical—its reactivity is due to its double bond and the two available acid groups.

• • •

AERO FUMARIC ACID and MALEIC ANHYDRIDE are important versatile intermediates for Chemical Synthesis.

*Trademark

MAIL COUPON TODAY!

C.I.7-50

AMERICAN Cyanamid COMPANY

Industrial Chemicals Division

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

Please send technical data sheet on:

☐ AERO DOP ☐ AERO PHTHALIC ANHYDRIDE
☐ AERO FUMARIC ACID ☐ MALEIC ANHYDRIDE

Send sample(s) of .....

Name ..... Position .....

Company .....

Address .....

City ..... State .....

deflocculation of non-fat milk solids, and a high degree of germicidal activity.

Soap, which tends to form calcium soap curd, has never been widely used for this application. Twenty years ago the simple type of cleaner[12] in use comprised:

Trisodium phosphate	60%
Soda ash	40%
Total	100%

This mixture still finds application today. However, it has generally given way to a more modern formula which has better balance.

For the requirements outlined above, the following materials (hydroxide, silicates, carbonates, phosphates) are especially suited, in order of decreasing effectiveness from left to right[4]:

Wetting Power	Sil. Hydrox. Phos. Carb.
Emulsion	Phos. Sil. Carb. Hydrox.
Protein Peptizing	Hydrox. Sil. Carb. Phos.
Deflocculation	Sil. Phos. Hydrox. Carb.
Germicidal Activity	Hydrox. Sil. Carb. Phos.

Silicates, especially the highly alkaline silicates with Na_2O/SiO_2 ratios of greater than 1.0, would appear to be the best agents if a single material had to be used. However, with the widespread installation of high-pressure homogenizers and high-speed milk pumps, unmodified silicate solutions are no longer used. Such solutions remove the lubricating surface-film from moving metal parts and cause seizing. Use of phosphates in the detergent mixture provides some degree of lubrication protection for machine parts of close tolerance. The silicates, however, are preferable to phosphates, carbonates, and hydroxides for use with tinned containers, since phosphates promote the stripping of the tin plate. A typical modern formula contains[12]:

Sodium carbonate	5%
Trisodium phosphate	20%
Sodium metasilicate	65%
Sodium hydroxide	5%
Sodium aluminate	5%
Total	100%

Occasionally, corrosion inhibitors are added to reduce the attack on tinned milk-handling equipment. For this purpose, sodium sulfite, sodium chromate, or sodium nitrate is employed. When it is desired to combine sanitizing action with cleaning, a source of available chlorine is frequently used. Such chlorine-releasing agents as Chloramine or the newer chlorinated trisodium phosphate complexes, in which sodium hypochlorite is stabilized by the presence of excess trisodium phosphate, are employed. With these modifications the combined sanitizer and detergent could have the following composition:

Sodium carbonate	30%
Trisodium phosphate	30%
Sodium metasilicate	20%
Sodium hydroxide	5%
Sodium chromate	7%
Chlorinated trisodium phosphate	8%
Total	100%

For washing milk bottles where dried milk deposit is encountered, a soak tank is installed ahead of the power washer. The polyphosphates are used because of their outstanding ability to deflocculate dried milk solids and the metasilicates to produce the highly desired sparkle of the milk bottles. If soap is employed, sodium tetraphosphate is frequently used to sequester the calcium. One widely used formula[16] for a presoak power bottle washer has the following composition:

Powered soap	6%
Sodium carbonate	7%
Sodium metasilicate	37%
Trisodium phosphate	37%
Sodium tetraphosphate	6%
Tetrasodium pyrophosphate	7%
Total	100%

BEVERAGE BOTTLE WASHING

The cleaning requirements for compounds to be used with power washers for beer bottles and soft drink bottles are less severe than for milk bottles, since fat emulsification and solid deflocculation are not normally required. Therefore, in these uses sodium hydroxide is employed for its protein solubilizing properties and its high germicidal activity at temperatures above 140°F., and silicates are used to give sparkle to the glass. A typical mixture contains:

Sodium hydroxide	85%
Sodium sesquisilicate	15%
Total	100%

PAINT AND ENAMEL CLEANERS

The film of oily soil which accumulates on painted surfaces is comparatively easy to remove with detergent compositions. The principal task in selecting soaps and builders for this purpose is to select materials which will have no harmful action on the painted surfaces. Cleaners for interior flat finish paints in general use more soap or synthetic detergent and less alkaline builder than do cleaners for gloss enamels. A mild liquid concentrate intended for this purpose contains:

Potassium-coconut oil soap	8%
Potassium oleate soap	6%
Sodium carbonate	4%
Borax	10%
Ammonia	8%
Water	64%
Total	100%

This concentrate is diluted at the rate of one pint per gallon of water for use. Trisodium phosphate is the basic ingredient of most powdered paint-washing products. These cleaners have the advantage of being effective at comparatively low concentrations and, in general, do not require rinsing following application. A cleaner of this type could have the composition:

Trisodium phosphate	32%
Sodium carbonate	57%
Sodium-corn oil soap	8%
Sodium metasilicate	3%
Total	100%

METAL CLEANERS

Metal cleaning frequently employs materials and methods which are entirely beyond the scope of the present discussion. Such operations as solvent degreasing, descaling and phosphatizing are not applications of detergency in the ordinary sense.

For the household cleaning of metal-ware, the general household cleaning formulations previously discussed are suitable. The problems encountered in such a case as the cleaning of dairy aluminum-ware become more difficult. Here powerful detergents are necessary but, at the same time, alkali corrosive action on the aluminum must be avoided or minimized.

Various inhibitors are employed for minimizing the corrosion of aluminum by alkalies. Among the most effective are gelatin, sodium aluminate, sodium fluosilicate, and sodium chromate. A suitable cleaner for aluminum which shows a minimum corrosive attack consists of:

Sodium carbonate	30%
Trisodium phosphate	15%
Sodium metasilicate	40%
Gelatin	9%
Sodium fluosilicate	6%
Total	100%

REFERENCES

1. Baker, C. L., Ind. Eng. Chem. *23*, 1025–32 (1931)
2. Bowman, F. C., Soap *16*, No. 4, 23–6, 72 (1940)
3. Carter, J. D., Ind. Eng. Chem. *23*, 1389–95 (1931)

YELLOTONE REFINED.
VIRGIN ROCK
DIAMOND "S" BRAND
ARROW BRAND ROLL BRIMSTONE

Stauffer
CHEMICALS
SINCE 1885

GOLDEN ROCK
TIGER BRAND REFINED
"ACID FREE" "RUN-OF-MINE"
SCREENED CRUDE SULPHUR
TRIANGLE BRAND

SULPHURS

ANCHOR BRAND FLOWERS OF SULPHUR U.S.P.
TIRE BRAND SUPERFINE COMMERCIAL FLOUR SULPHUR
TUBE BRAND "CRYSTEX" INSOLUBLE SULPHUR

BUY SULPHUR BY STAUFFER

AGRICULTURAL SULPHURS

OTHER STAUFFER PRODUCTS

BHC (Benzene Hexachloride)
Borax
Boric Acid
Boron Trichloride
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlordane
Chlorine
Citric Acid
DDT (Dichloro Diphenyl Trichloroethane)
Ethylene Trithiocarbonate
Lindane
Silicon Tetrachloride
Sodium Hydrosulphide
Sulphur Chloride
Sulphuric Acid
Tartaric Acid
Textile Stripper
Titanium Tetrachloride
Toxaphene (Chlorinated Camphene)
2,4-D (Acid, Isopropyl Ester, Amine Salts)

Since 1885, the words "Stauffer" and "Sulphur" have become virtually synonomous. Today, eight Stauffer plants refine and process sulphur, and are conveniently located at Bayonne, N. J., St. Louis, Mo., Harvey (New Orleans), La., Freeport, Texas, Orlando, Fla., Los Angeles, Cal., Berkeley, Cal., and North Portland, Ore.

Stauffer Sulphurs are processed grades of elemental sulphur in Refined (not less than 99.8% pure) and Commercial (not less than 99.5% pure) grades. There are several physical forms—Lump, Roll, Flour, Flowers and Insoluble. The Flour or powdered grades are obtainable in a number of finenesses. These many available types of elemental sulphurs make Stauffer the acknowledged sulphur headquarters of the world.

Stauffer

CHEMICAL COMPANY

420 Lexington Avenue, New York 17, N. Y.
221 North LaSalle Street, Chicago 1, Illinois
824 Wilshire Boulevard, Los Angeles 14, Cal.
636 California Street, San Francisco 8, Cal.
424 Ohio Bldg., Akron 8, O. — Apopka, Fla.
N. Portland, Ore. — Houston 2, Tex. — Weslaco, Tex.

4. Davies, W. L., Dairy Ind. *4*, No. 1, 3–6 (1939)
5. Fall, P. H., J. Phys. Chem. *31*, 801–49 (1927)
6. Harris, J. C., Oil and Soap *23*, 101–10 (1946)
7. Harwood, F. C., J. Textile Inst. *39*, 513–25 (1948)
8. Hughes, R. C., and Bernstein, R., Ind. Eng. Chem. *37*, 170–5 (1945)
9. van der Hulst, L. J. N., and Schuffelen, A. C., Chem. Weekblad *38*, 134–40 (1941)
10. Kling, W., and Schwerdtner, H., Melliand Textilber. *22*, 21–8 (1941)
11. Lesser, M. A., Soap Sanit. Chem. *23*, No. 7, 36–9 (1947)
12. Lesser, M. A., Ibid. *24*, No. 5, 40–3 (1948)
13. Monsanto Tech. Bull. No. P-139 (1949)
14. Niven, W. W., Jr., Fundamentals of Detergency, Reinhold Publishing Corp., New York (1950)
15. Rumford Chemical Co., Bulletin No. 64
16. Roungsfell, E. O., Dairy Ind. *2*, 66–7 (1937)
17. Snell, F. D., Ind. Eng. Chem. *24*, 76–80 (1932)
18. Snell, F. D., Ibid. *25*, 162–5 (1933)
19. Snell, F. D., Ibid. *25*, 1240–6 (1933)
20. Stericker, W., Ibid. *15*, 244–8 (1923)
21. Vaughn, T. H., and Vittone, A., Jr., Ibid. *35*, 1094–8 (1943)
22. Vaughn, T. H., and Smith, C. E., J. Amer. Oil Chemists' Soc. *25*, 44–51 (1948)
23. Wilson, J. L., and Mendenhall, E. E., Ind. Eng. Chem. Anal. Ed. *16*, 251 (1944)

SPECIALTIES NEWS

Common Weed Yields New Insecticide

A potent new insecticidal chemical, an amide called scabrin, was found recently in the roots of a common native perennial weed by U. S. Department of Agriculture chemist Martin Jacobson. Early experimental trials with the new insecticide, derived by extracting the active principal from plants of the genus Heliopsis (commonly known as ox-eye) showed it to be appreciably more toxic to houseflies than pyrethrum, the standard of comparison in laboratory tests.

Aside from chemical properties, the insecticidal toxicity of the new material is the only biological fact known about it so far. How difficult it may be to obtain from the natural weed source and manufacture is not known. The effect of the chemical on insects other than houseflies, or what it does to man or animals, plants or soils, are subjects still to be explored. At present it appears to be distinctly irritating to the respiratory passages.

The Bureau of Entomology and Plant Quarantine in cooperation with the Bureau of Plant Industry, Soils and Agricultural Engineering plans to gather information this summer on the culture of Heliopsis, and to determine the extent to which scabrin is produced in plants grown under cultivation. If screening tests show scabrin to be as lethal to a considerable number of insects as to the housefly, arrangement for some toxicological tests may be made.

Lodes Inaugurates New Aerosol Service

A new type of service for manufacturers who wish to get in on the aerosol boom or further extend their interest in the field, has just been established by Frederick G. Lodes. The new organization—Aerosol Development, 60 E. 42nd St., New York, N. Y.—will direct all phases of research and development of new products, including formulation; selection of container, valve and propellent; and test marketing. Lodes, associated with the aerosol field for the past five years in working

FRED LODES: Push button planner.

for General Chemical Division of Allied Chemical and Dye Corp. on the Genetron development, feels that this is a service that none of the custom or contract aerosol fillers are in a position to offer, and one which will aid them in expanding the market for push-button products.

His organization, for example, in working with a cosmetic house, will tell the customer whether it is feasible to package a product in an aerosol container, and if so, will even direct the research in the company's own laboratories, if desired. He will work out solubility and corrosion data, desired pressure, spray pattern, etc., and fill sufficient cans for test marketing before making arrangements for contract filling, or aiding the company to set up its own filling line. This type of service, Lodes feels, will mean more diversification and individuality, and will permit the trade to divorce itself from a "standard package," thus encouraging growth in many directions.

Velsicol Wins Exclusive on Chlordane Manufacture

Velsicol Corp., Chicago, won exclusive manufacturing rights for chlordane when the U. S. Supreme Court refused to review the case of Julius

Hyman, head of the Denver company bearing his name, thus making effective a previous decree of lower courts enjoining Hyman from using or disclosing formulas and processes for making chlordane. Hyman is the former director of research and general manager of Velsicol who resigned in 1946, and set up his own business in Denver, making use, Velsicol charged in its suit, of the inventions and insecticides he discovered while working for Velsicol.

Julius Hyman & Co. has discontinued manufacture and marketing of chlordane, and is directing its main attention to development of its two new insecticides, aldrin and dieldrin, and other products under investigation in its laboratories. New manufacturing facilities for the insecticides were rushed to completion to make aldrin available for use against cotton insects here and grasshoppers in Canada this season. Both are now commercially available for large-scale use under experimental labels, and Shell Chemical Corp. will handle national distribution of the unformulated materials.

Velsicol, however, has a suit pending in the Denver District Court to restrain Hyman from making and selling aldrin. Its basic charge, like the suit involving chlordane, is that formulas and processes relating to aldrin were discovered in Velsicol's laboratories, and that Hyman and other former employees now with the Hyman company are bound by contract and other confidential relations to assign the inventions to Velsicol.

Standards for Plastic Wall, Tile and Adhesives

The first commercial standard for polystyrene plastic wall tile has just been issued by the National Bureau of Standards, Washington, D. C. It is identified as Commercial Standard CS 168-50 Polystyrene Plastic Wall Tiles and Adhesives for their Application.

As a guide to producers, distributors, contractors, architects, installers, and users, the purpose of this commercial standard is to establish a minimum standard of quality for polystyrene plastic wall tiles and the adhesives used in their application.

Report Lists Expired Detergents Patents

The first of a series of reports listing expired patents in certain fields of wide technical interest to be published by Patent Publications, Box 4094, Washington 15, D. C., is a special grouping of 206 official patent abstracts on the subject of detergents. These are divided as follows: toilet soaps, household and heavy duty cleaners, 54; metal cleaning, pickling and descaling, 73; paint, varnish and finish removers, 25; textile detergents and cleaners, 14; and, miscellaneous, 40. The booklet contains a subject index. Price is $2.00.

Norman Nuttall (left), appointed assistant technical director, Stein, Hall & Co.; and Almon G. Hovey who has joined the research division of Archer-Daniels-Midland. Mr. Hovey was with General Mills Chemical Division between 1944 and 1949.

"What's New" Memo

In your business are you concerned with herbicides and plant growth regulators? Specialty oils, greases, waxes? Detergent testing? Food preservatives? Wax research? Dry cleaning compounds?

You'll want to read the latest in these fields in these articles in this issue:

New Insecticide Plant Opens

The new $100,000 insecticide plant of the Coahoma Chemical Co. at Clarksdale, Miss., has begun production. It is making liquid and dust agricultural insecticides.

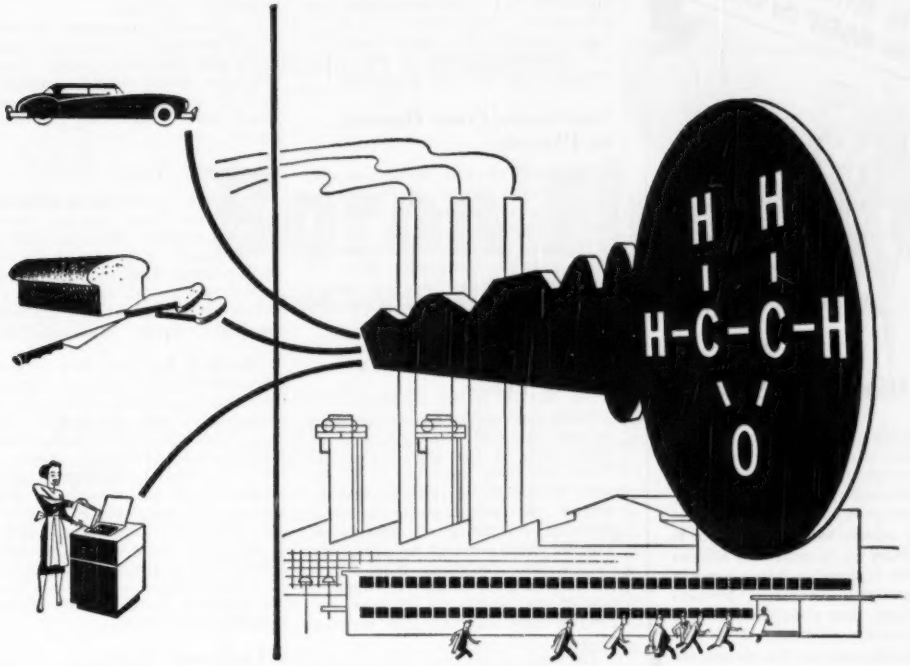
Odor Control Circular

A concise, readable presentation of the problem of undesirable household and industrial odors together with practical methods for their control, is given in a new circular, *Control of Odors*, just published by the National Bureau of Standards. This pamphlet now available from the Government Printing Office at 10 cents a copy is based on research conducted at the Bureau and on critical consideration of the extensive technical literature on odor control.

Report on Parathion Respiratory Devices

A report entitled "Respirators for Field Use for Inhalation Protection from Dusts or Mists of Parathion Insecticides" has been prepared by the U. S. Department of Agriculture, and copies are available from the Bureau of Entomology and Plant Quarantine

ETHYLENE OXIDE



key to modern conveniences

Your daily bread may be fresher and keep longer due to conditioners made from ethylene oxide. The detergents you use, the permanent anti-freeze in your automobile radiator, and some of your wife's cosmetics may all depend upon ethylene oxide.

Practically every major industry, from textile to mining, uses ethylene oxide or one of its many derivatives. Even the gas you use to heat your home may have been dehydrated by diethylene glycol—made from ethylene oxide.

Because of its ability to react readily with many other chemicals including fatty acids, phenols, alcohols, and water, ethylene oxide may well be the key component in many of the articles of your everyday living.

The Dow Chemical Company, as a major producer, is interested in your ethylene oxide requirements. For further information or technical assistance, write us at Midland.

THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN

DOW ALSO PRODUCES over 600 chemicals including: caustic soda, phenol, aniline, hydrochloric acid, monochlorobenzene, propylene oxide, epsom salt, propylene glycol, ethylene glycol and other industrial, pharmaceutical and agricultural chemicals.

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

or Insecticide Division of Production and Marketing Administration, Washington 25, D. C. This information was obtained in a study made by the Interdepartmental Committee on Pest Control concerning devices for use in connection with pesticidal chemicals.

Insecticide Plant Opened In Phoenix

A $500,000 plant for the manufacture of insecticides and allied products has been opened in Phoenix, Ariz., by California Spray Chemical Corp.

The new plant was established in Phoenix as the distribution point for the vast Southwest market, saving freight charges and giving customers more rapid service.

Charts to Check Paint's Hiding Power

Charts bearing black, white and gray patterns of rated color strength are being made by the Morest Co., 211 Centre St., New York 13, N. Y., for paint manufacturers to check and determine the hiding power of their products. A coating of transparent Vinylite resins prevents the paint from soaking into the paper charts, thus providing a good surface for application of the sample. In addition, the Vinylite resin coating does not discolor.

Thickness of the paint film is easily calculated, and its hiding power can be determined either visually or by mechanical means. Charts are made to be used with Hunter Multipurpose Reflectometer for contrast ratio measurements. The charts are available in patterns of black over gray, gray over white and black over white—all colors of predetermined light-absorbing capacities.

Pittsburgh Is Building Parathion Plant

A new plant for production of parathion and several other organic phosphate insecticides is under construction by Pittsburgh Coke & Chemical Co. It will incorporate a new, economical process originally developed by the German chemical concern, Farbenfabriken Bayer, and improved by Bayer and Pittsburgh. The plant is expected to be in production in the early fall at Neville Island, Pa.

Pittsburgh Coke & Chemical's relationship with Bayer is through the Geary Chemical Corp. of New York which had a contract with Bayer for the manufacture and distribution of agricultural chemicals originated and tested by Bayer. Pittsburgh and Geary have formed a joint subsidiary, Chemagro Corp., to exploit certain of these developments. Pittsburgh Coke & Chemical will manufacture for Chemagro Corp. and Chemagro will market these new agricultural products through Geary Chemical Corp., the Pittsburgh Agricultural Chemical Company, and others.

In addition to parathion, one of the several products to be manufactured in the new plant is a systemic insecticide—one which may be applied to seeds or seedlings to render the plants which grow from them resistant to insects.

Company Notes

• **Advance Solvents & Chemical Corp.,** New York, has just formed a new company, Advance Solvents & Chemical Corp. of Canada, Ltd. in Montreal. Early manufacture of naphthenate type and octoic type driers for the paint and protective coatings industry is contemplated.

• **Merck & Co., Inc.,** first producer of Cortisone by chemical synthesis, has made it available since early this month to a large number of hospitals throughout the United States under the trade mark "Cortone." Price of this promising drug for rheumatic diseases will be $28.50 per vial to hospitals, equivalent to $95 per gram. This is the fourth in a series of price reductions which have brought the price down from an original figure of $200 per gram, the amount first paid by qualified clinical investigators.

• **Large-scale manufacture** of emulsion tackifiers for neoprene latices has been resumed by the American Resinous Chemicals Corp., Peabody, Mass. The current shortage of natural rubber latex has increased the demand for neoprene latex tacifiers.

• **The 1950 edition** of the Iscomist Aerosol Guide for Greenhouses, an 18 x 25 chart for posting on the headhouse wall of every greenhouse for handy reference, has just been published by the Insecticide Division of Innis, Speiden & Co., 117 Liberty St., New York 6, N. Y. A copy may be obtained by writing to the company.

• **Foster & Kester Co., Inc.,** 2601 N. Broad St., Philadelphia, Pa., has changed its name to Krylon, Inc.

• **The Chas. H. Phillips Co.** Division of Sterling Drug, Inc. will take over the management, sales, advertising, billing and shipping functions of the Cummer Company Division of the same organization. Manufacture of Energine products will continue as the responsibility of the Cummer division at its plant in Brattleboro, Vt.

• **Kraft Chemical Co.,** Chicago, has been appointed Midwest sales representative for Better Finishes & Coatings, Inc., Newark, N. J., manufacturer of paint, plastic and chemical products.

How Can You Benefit From This Versatile Catalyst? BF_3

Boron Fluoride

ETHER COMPLEX, PHENOL COMPLEX OR COMPRESSED GAS

UNUSUALLY VERSATILE Boron Fluoride offers important advantages for a wide range of reactions. Some of these are listed at right. Such benefits merit thorough investigation in any operation where the catalytic properties of BF_3 can be utilized. They may mean increased economy and efficiency in your process too! Further information helpful in evaluating BF_3 for your needs is available from any B&A office.

AS A PIONEER in the field of fluorine compounds, Baker & Adamson introduced BF_3 Etherate to industry a number of years ago. Today it also offers the Compressed Gas and Phenol Complex in commercial quantities. In addition, extensive production and research facilities place B&A in a preferred position to work with you in development of other BF_3 complexes to meet individual specifications.

SOME ADVANTAGES BF_3 OFFERS IN PROCESS USE:

- Operating temperature ranges are wider.
- Yields are increased.
- Separations are easier and no bulky sludges are formed.
- Properties of end-products are improved.
- More reactions are carried to completion.
- Fewer undesirable waste materials result.
- Smaller quantities have greater catalytic activity.
- Little or no extraneous material is introduced into the system.
- Reactions are moderated or more easily controlled.

USES OF BORON FLUORIDE AS A CATALYST

1. Polymerization and co-polymerization of mixed unsaturates.
2. Selective esterification of mixtures of organic acids.
3. Cyclization of synthetic and natural elastomers after polymerization or in starting from monomers.
4. Condensation of modified phenolics.
5. Preparation of alkyl phenols.
6. Refining of aromatic and paraffinic solvents by polymerization of the olefins they contain.
7. Modification of mixtures of esters and acids by polymerizing conjugated compounds selectively.

REAGENTS
B&A
STANDARD OF PURITY
FINE CHEMICALS

BAKER & ADAMSON *Fine Chemicals*

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N. Y.

Offices: Albany* • Atlanta • Baltimore • Birmingham* • Boston* • Bridgeport* • Buffalo* • Charlotte* Chicago* • Cleveland* • Denver* • Detroit* • Houston* • Los Angeles* • Minneapolis • New York* Philadelphia* • Pittsburgh* • Portland (Ore.) • Providence* • St. Louis* • San Francisco* • Seattle Wenatchee (Wash.) • Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks are carried here.

ANTARA®
SURFACTANTS*

For example...
A SURFACTANT
can make an insecticide
work sooner, harder
or longer

***a Surfactant**
is a surface active agent

For example...
A SURFACTANT
can make this label
obsolete

One of them may make your products easier to sell

SURFACTANTS are specialized chemicals that have the unique habit of concentrating *in the surface* of liquids or *on the surface* of solids. Because they seek the surface, they spread quickly over any surface and even *increase the surface area* when they can.

Thus a Surfactant can serve—in an insecticide—to keep the ingredients mixed, to spread the insecticide over a wider surface, and as a result help to make it adhere for a longer time. Or—in a cosmetic—to emulsify and keep in suspension materials that otherwise would not mix... Surfactants serve variously as detergents, as dispersants, as emulsifiers, as wetting agents, as foam builders, or as anti-foaming agents.

More than thirty industries—including the rubber, petroleum and rayon fields—have profitable uses for Surfactants.

Antara Surfactants are important ingredients in some of the most spectacular, new products on the market today. One of them may make your products easier to sell—and possibly less expensive to manufacture.

Extensive research staffs and facilities support the development and application of Antara Surfactants—available to work with you in the improvement of an existing product or the development of a new one. Your inquiry is invited—without obligation. It will bring a prompt opinion as to whether one of the Antara Surfactants may be adaptable to your needs. Kindly address your inquiry to Department 34.

ANTARA® PRODUCTS

SURFACTANTS... CARBONYL IRON POWDERS

GENERAL ANILINE & FILM CORPORATION

444 MADISON AVENUE • NEW YORK 22, NEW YORK

NEW CHEMICAL SPECIALTIES

Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Products and Processes department.

Rabbit Repellent

New formulation to prevent damage to gardens being test marketed.

A new rabbit repellent for gardeners that greatly reduces the amount of damage to agricultural crops, flowers and vegetables has been introduced commercially by B. F. Goodrich Chemical Co., 324 Rose Building, Cleveland 15, Ohio. Active ingredient (23%) is zinc dithiocarbamate-amine complex; inert ingredient, clay (77%).

The new chemical formulation, called "No-Nib'l," is packaged in powder form in small cans (six ounces net weight) that contain a sufficient quantity to protect the area of the average small home garden plot. It can be dusted on vegetable plants and flowers or can be mixed with water and used as a spray. Applications should be repeated if heavy ran washes it off.

Distribution will be established this year in a test market area in Ohio, Indiana and Western Pennsylvania, with nationwide distribution planned for 1951. Orders received from other parts of the country will be handled by the company on a direct mail basis at a price of $1.00 per can.

Liquid Auto Wax

Speed and ease of use feature new Johnson product.

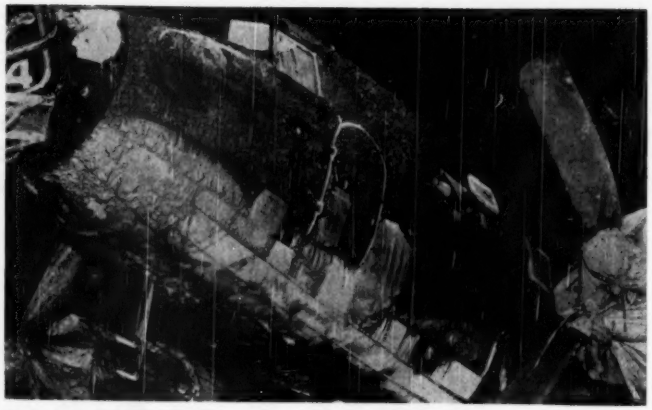
S. C. Johnson & Son, Inc., Racine, Wisc., has attained U. S. and Canadian distribution of its new automotive body wax, Car-Plate. According to Johnson, the wax can be applied to a clean passenger car in 20 minutes; instead of buffing or polishing, one uses finger-tip pressure to wipe off the haze that appears within a few minutes, and the result is a high-luster, protective wax film.

Car-Plate is sold in 10 oz. and gallon containers. One gallon, said to polish 40 cars, sells for $4.50 a gal. or $18 a case of four gallons.

Multi-Purpose Paint

Tough paint has rubber base.

Widger Products Corp., Alexandria, Va., is aiming at national distribution for its rubber-based paint, Proall. Containing no white lead or zinc oxide, the new paint is said to be water- and rust-proof and resistant to acids, alkalis, mildew, etc., and is furnished in gloss, semi-gloss and flat for a variety of uses. Widger is marketing chiefly through distributors. Retail prices range from $5 to $9.75 per gal. in quarts, gallons, 5 gal. pails, and drums.



Blistered appearance eight minutes after application of new nonflammable flush-off paint remover indicates that paint film is lifting. Craft will be flushed off with water under pressure.

Improved Paint Remover

Formula modification makes stripper less corrosive, more stable.

A nonflammable flush-off paint remover formulation developed by the Dow Chemical Co. has been modified to give a product less corrosive to steel, tin-plated steel and aluminum alloys; more stable; and without objectionable vapors during preparation from ethylamine, which is eliminated.

A large number of paint remover manufacturers have adopted the new formula which raises all common paint, varnish and lacquer films in 1 to 10 minutes, permitting flushing with water. (See cut.) The new formula (cf. *CI, March 1949, p. 418*) designated by Dow as Formulation D-316-14A follows:

Methylene chloride, PRG	71 gal.
Carbon tetrachloride	6 gal.
Methanol	12 gal.
Di-triisopropanolamine, PRG	9.5 gal.
Water	1.5 gal.
Methocel, 4000 cps., PRG	13 lbs.
Areskap 100 (Monsanto Chemical Co.)	33 lbs
Potassium oleate	22 lbs.
Paraffin (47-50.6°C. m.p.)	16.5 lbs.

To prepare the product, carbon tetrachloride is added to the methylene chloride, and then the paraffin is melted and dissolved in this mixture with agitation. Methocel is added and stirred until completely wetted out. Methanol is added slowly and stirred until Methocel is completely dispersed. Potassium oleate and Areskap 100 are added. The di-triisopropanolamine mixture is added, and finally the water.

Synthetic Sweetening Agent

Sweetener can be used in cooking, baking and canning.

Abbott Laboratories is now marketing a synthetic sweetening agent similar to saccharin in its ability to sweeten foods without adding calories or carbohydrates. However the new product, Sucaryl Sodium, is unlike saccharin in that it leaves no bitter after-taste when used in ordinary proportions, and also can be used in any type of cooking process, says Abbott. As a result, use of Sucaryl will enable diabetics and reducing patients to eat a greater variety of foods than afforded by using saccharin.

Sucaryl is supplied to druggists in effervescent tablet form, with each eight-gram tablet equivalent in sweetening power to one teaspoonful of sugar. 100 tablets are fair-traded at $.59, 1,000 at $2.97. In powder form for commercial use, prices start at $3.85 for 5 lbs., with reductions for quantity purchases.

Each tablet of Sucaryl Sodium contains 125 mg. of sodium cyclohexylsulfamate, 269 mg. of sodium bicarbonate, and 240 mg. of tartaric acid. Tests have shown good toleration with no harmful side-effects.

Low-Priced Aerosol

Bridgeport Brass introduces 79¢ aerosol insecticide.

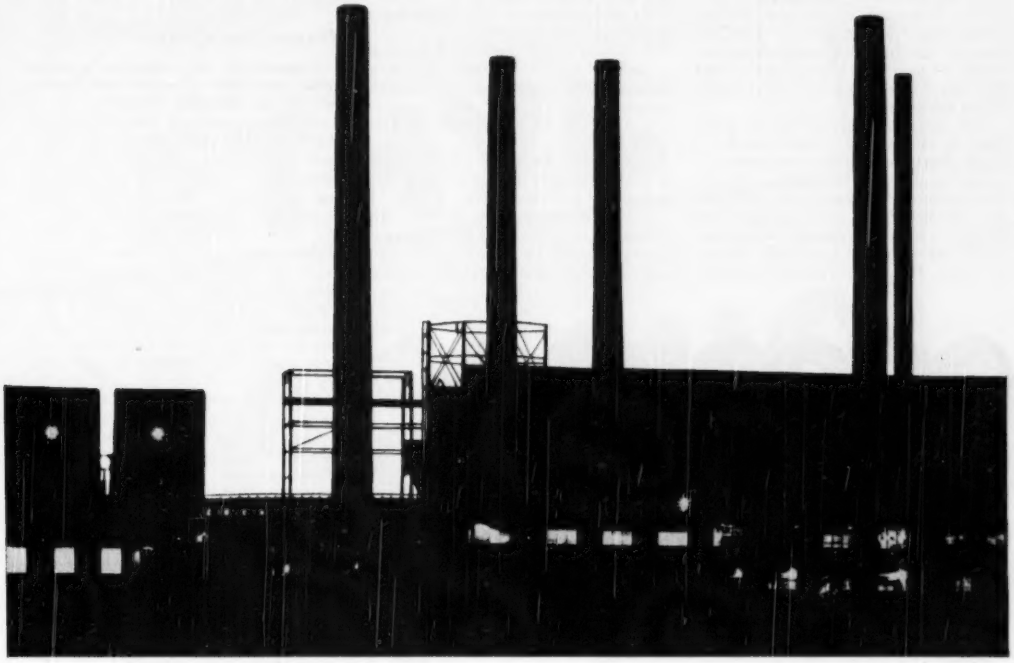
Bridgeport Brass Co., Bridgeport 2, Conn., has introduced a 79¢ aerosol spray insecticide to the market. The new package is expected to bring Bridgeport Aer*a*sol within the price range of many more people. The company reports it is being enthusiastically received by the trade, for it opens to Bridgeport distributors every drug, grocery, hardware, variety and retail market in the country. This 79¢ package is said to be receiving considerable interest from chain stores and the syndicate type of variety stores because it is priced to develop the volume and turnover so necessary in such outlets.

Defoamer

New defoamer in brick form easy to handle, use.

A new effective defoamer in unique, convenient form—2½-lb. brick—has

Does your plant use surface active agents?



IF SO, investigate the ULTRAWETS—the family of alkyl aryl sulfonates tailor-made for particular jobs. Available in liquid, flake or bead form. We are confident that one of the ULTRAWETS will suit your needs—probably more efficiently or more economically than the product you now use.

INDUSTRIAL AND HEAVY DUTY DETERGENTS—High density ULTRAWET SK and ULTRAWET K are outstanding for dry mixing with builders.

TEXTILE DETERGENTS—Liquid ULTRAWET 35KX is the most economical alkyl aryl sulfonate for volume use. Flake ULTRAWET K or bead ULTRAWET SK are suggested where dried products are desired.

WETTING AGENT OR PENETRANT—The liquid ULTRAWET 30E, ULTRAWET 30DS or ULTRAWET 60L offer a diversified choice of wetting, penetrating, foaming and solubility characteristics. ULTRAWET DS is available if you prefer a dry product.

LIGHT DUTY DETERGENT—ULTRAWET SK is the product for this use—no builders are necessary.

LIQUID HOUSEHOLD DETERGENT—ULTRAWET 60L is outstanding because of its sudsing and solubility properties.

Regardless of your use, our technically trained salesmen with broad experience in the field can no doubt help you. We'd like to hear from you. The Atlantic Refining Company, Chemical Products Section, 260 S. Broad Street, Philadelphia 1, Pa.

ATLANTIC

PETROLEUM CHEMICALS

In the East
THE ATLANTIC REFINING COMPANY
Philadelphia • Pittsburgh • Providence
Charlotte • Chicago

On the West Coast
L. H. BUTCHER COMPANY
San Francisco • Los Angeles • Seattle
Salt Lake City • Portland • Oakland

In Canada
NAUGATUCK CHEMICALS
Division of Dominion Rubber Co., Ltd., Canada
Elmira • Montreal • Toronto • Windsor
Winnipeg • Saskatoon • Calgary

been commercially introduced by Hercules Powder Co., Wilmington, Del. Called Defoamer 4, the new product offers these advantages in handling and use: excellent defoaming efficiency; small storage space; no drums to handle; one brick makes a batch; stable dilute emulsions.

The easy-to-handle brick is packaged in an individual carton and will make about forty gallons of a final dispersion at 0.75 per cent solids. Twenty bricks—enough defoamer for 800 gallons of dispersion—are packaged and shipped in a corrugated container which can be stored in a small amount of space. The bricks can be stored indefinitely in a cool place without losing their effectiveness.

Typical procedure for preparing a dispersion is as follows:

1. Soften twenty gallons of water in a tank or other container which is equipped with a high-speed mechanical mixer.

2. Heat the softened water to 160-170° F.

3. Add the Defoamer 4 brick and agitate vigorously until it is completely melted and well dispersed.

4. Add twenty gallons of cold, presoftened water. The final emulsion temperature should be below 115° F. If a concentration lower than 0.75 per cent solids is desired, additional soft water may be added.

Home Dry Cleaner

Commercial dry cleaning concentrate marketed at retail with heavy advertising stressing economy.

Another important factor looms in the household dry cleaning products field with the introduction on the consumer level of Re-Clean, a dry cleaning concentrate sold for eleven years to commercial cleaners. First put on the market by The Re-Clean Corp., Empire State Bldg., New York 1, N. Y., in January of this year, it has been test marketed in 33 markets and national distribution is planned. A 12-ounce bottle sells for $.98; a 1-quart can for $1.98. Main sales outlets are drug, hardware, department and variety stores.

A heavy advertising campaign is employing newspapers, spot radio, television, magazines, and point-of-sale material to feature the economy appeal of the product. ("Slash dry cleaning costs!" is the selling slogan.) Four ounces of Re-Clean are added to one gallon of water to form the solution in which dresses, neckties, upholstery, etc. can be cleaned at a fraction of the cost in a dry cleaning shop. Advantages claimed over usual home solvent type cleaners are that there is no storage problem in keeping the concentrate, it is non-explosive (although the material is combustible), non-toxic, is easy on the hands, and doesn't leave rings. It can be used just for spotting, or for complete cleaning by dipping or sponging.

Cleaner and Sanitizer

Floor maintenance product combines disinfectant and cleaning action.

Comp is the name of the new combination cleaner and sanitizer which Fuld Bros., Inc., 702 Wolfe St., Baltimore 31, Md., is offering to the sanitary products trade. Savings in labor cost as a result of doing two jobs with one material, as well as improved cleaning and disinfection are claimed. The material is available in one- to 55-gallon drums, and in one-gallon cans.

Automobile Polish

New polish "not a paint, lacquer or wax" developed by Du Pont.

A new polishing composition called Du Pont Spray Glaze and designed for use by professional operators, has been developed by the Du Pont Co. Not a paint, lacquer or wax, it can be applied to the whole surface of a car in 10 to 15 minutes with a specially designed spray gun under 30 to 35 lbs. pressure. It dries white in two or three minutes, and then is simply wiped off. This produces a dry, brilliant lustre said to last a remarkably long time. No rubbing or buffing is necessary.

From SHELL CHEMICAL

ETHYL ALCOHOL

*and authorized grades**

***NEOSOL—a proprietary solvent**

***SPECIALLY DENATURED GRADES as authorized by the Alcohol Tax Unit of the U. S. Treasury Department.**

WHEN you need clean alcohol with exceptionally mild odor . . . when consistent quality is important . . . consider Shell Chemical as a prime source to fill your needs. Shell Chemical's Ethyl Alcohol is derived synthetically from ethylene . . . under rigidly controlled conditions. Samples and further information will be sent upon receipt of your letterhead request.

SHELL CHEMICAL CORPORATION

CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE

Eastern Division: 500 Fifth Avenue, New York 18 • Western Division: 100 Bush Street, San Francisco 6
Los Angeles • Houston • St. Louis • Chicago • Cleveland • Boston • Detroit • Newark

Any car dealer or service station operator with a standard compressor can use the new process. No masking of chrome or glass is necessary, and it can even be used in the hot sun.

Two special cleaners for use with Spray Glaze have also been developed by Du Pont. Spray Glaze Cleaner No. 1 is for hand application; Spray Glaze Cleaner No. 2, for use with a polishing machine.

Dealer prices per gallon are $6.75 for Spray Glaze, $2.60 for either cleaner. Du Pont jobbers have an introductory offer containing two gallons of the polish, a gallon of each cleaner, and a DeVilbiss spray outfit for $50.

Non-Slip Coating

Abrasive, slip resistant coating for wood, most metals, concrete marketed to industrial plants.

The Merchants Chemical Co., Elm Court, Stamford, Conn., has recently introduced Dyna-Grip, a tough, abrasive, non-slip coating for wood, metals (except galvanized iron), and concrete. A non-conductor of electricity, it resists water, salt air, acids, alkalis, oil, gasoline and grease. It is being sold to industrial plants in 1- and 5-gallon cans and 55-gallon metal drums. It comes in gray, black and white, the first two selling for $5.05 a gallon in 1-gallon cans and the latter, $5.45.

It is applied directly by brush to wood or concrete. For application to metal, the surface must first be wire-brushed, degreased with Merchant's Dyna-Clad #200 thinner, and then coated by brush or spray with Dyna-Clad primer before applying Dyna-Grip.

Antiseptic Polish

Cream furniture polish said to kill odors and germs.

A furniture polish of the cream emulsion type is being sold by Sanitest Co., 66 W. Broadway, New York, N. Y., with the recommendation that it be used in places where antiseptic action is desirable. Odorless and greaseless itself, it is said to kill unpleasant odors and germs, and to be particularly useful in sick rooms, on telephone mouthpieces, etc. Packaged in glass containers, it is sold through hardware stores, groceries, etc., in pints, quarts, and gallons at $.79, $1.39 and $4.95.

Water-Remover for Metals

Product removes water from metals after cleaning.

Aqua-Off is the name of a water-remover that has been developed by the Chemclean Products Corp., 64-6th Ave., New York 13, N. Y., to remove water from plated or unplated work, such as pieces that have been polished, cleaned in alkali cleaner and then rinsed in hot or cold water prior to storing or lacquering. For a dry surface, free of water stains, the work is immersed in the Aqua-Off after the final hot water rinse, gently agitated, and then removed. Water is displaced and falls to the bottom of container, leaving the work free from water but covered with a slight film from the Aqua-Off, which is readily removable by holding it in the vapors in a degreaser.

This procedure eliminates the use of sawdust or drying cabinets with their attendant disadvantages.

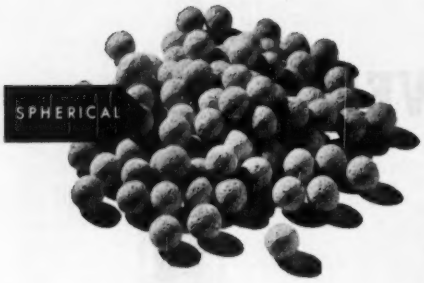
Silicone Resins

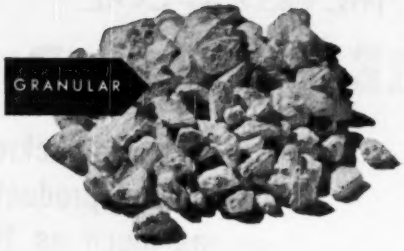
Electrical applications recommended for new silicone resins.

Two new silicone resins have been introduced for electrical applications by General Electric Co., Pittsfield, Mass.

One, designated G-E silicone insulating resin number 81132, is a flexible resin of good drying speed. It is tough, fast-drying without a catalyst, has excellent build on glass cloth, and good heat life. It is intended for use as a coating on glass cloth and glass sleeving, and as a sticker for mico-glass tape and other flexible mica products. It is supplied as a 60 per cent solution in toluol.

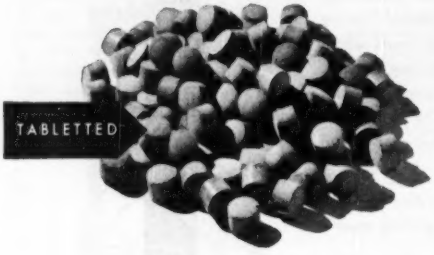
The other new resin is designated G-E silicone resin number 81145 and is supplied as a 50 per cent solution in





HARSHAW

you specify the catalyst



HARSHAW can make it!

• Harshaw has a large production capacity for preformed catalysts. In many cases economies can be realized by having Harshaw manufacture catalysts to specification for Hydroforming . . . Cyclization . . . Oxidation . . . Dehydrogenation . . . Hydrogenation . . . Dehydration . . . Desulphurization . . . Alkylation . . . Isomerization. Typical catalysts and catalytic chemicals are . . . Aluminum Chloride Anhydrous . . . Boron Fluoride Addition Compounds . . . Boron Trifluoride . . . Hydrofluoric Acid Anhydrous . . . Activated Alumina . . . Chrome Alumina . . . Molybdena Alumina . . . Tungsten Alumina . . . Cobalt . . . Copper . . . Copper Chromite . . . Magnesia . . . Nickel . . . Vanadium.

Our experienced technical staff will assist you in developing the best and most economical catalyst. If you have a catalytic process in the development or production stage, a discussion with us may prove beneficial.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

petroleum spirits. It was designed for bonding and impregnating motors, generators, and transformers requiring Class H insulation. However, it may be used in bonded mica, mica tape, and glass combinations. When extreme flexibility is not desired it can be used effectively as a coating for glass cloth and sleeving. When properly cured it is a relatively hard resin but maintains a high degree of flexibility. It will through-cure readily and develop good bonding properties at elevated temperatures. It is to be used as furnished; no catalyst is necessary.

Prime-Sealer for Walls

Successful painting of dry walls possible with one coat of pigmented sealer.

A pigmented wall primer-sealer said to solve the problem of painting dry wall construction has been developed by Devoe & Raynolds Company, Inc., 420 Lexington Ave., New York 17, N. Y. The product is designed for interior walls of plaster and masonry or composition wallboard.

Previously developed materials are claimed to "soak" unevenly into the surface of walls as a result of the dispersion of oils and pigments, causing spottiness and necessitating a second application of sealer. The new chemical process provides firm adhesion and controlled penetration, thus making a single coat of sealer sufficient for even highly porous surfaces.

The new product also is said to permit use of deep-tone flat colors without cloudiness or the appearance of "shiners" over patched joints in dry wall construction. It is being manufactured in a non-blued white but it can be tinted with toner colors, oil colors or with the finishing paint.

In addition to its use on unseasoned or previously unpainted plaster, brick, cement and such other porous surfaces as wallboard, insulation board and plaster board, the primer sealer can also be used as an undercoat in refinishing work or as a primer coat for combination masonry and plaster and wood.

Insecticide Spray

Household product contains four insecticides.

A new household insecticide claimed to be lethal to resistant flies has been introduced by the agricultural chemicals division of Canadian Industries Limited. Marketed under the trade name "Ridsect"—the same name as used for an earlier product—the spray contains four insecticides: DDT as a stomach and contact poison; pyrethrum for quick knock-down action; dimethyl naphthalene as a fumigant; and methoxychlor, a contact and stomach poison to control insect pests which may have developed a resistance against DDT.

The new spray not only kills quickly but retains its effectiveness long after

application. It is estimated that one 16-ounce container of the four-way action insecticide will treat 160 square feet of surface. It is formulated to be ready for immediate use and is said to be effective not only against flies and mosquitoes, but also such hard-to-kill pests as moths, cockroaches, ants, bedbugs, carpet beetles, silver fish, etc.

Synthetic Enamel

New coating for toys, kitchenware, etc. resists marring and chipping.

A new synthetic enamel with improved resistance to marring and chipping is now being offered by Monsanto Chemical Co. A product of its Everett, Mass., plant, it is said to have high gloss, non-chipping, mar-resistance, excellent coverage, adhesion and flexibility, short baking cycles and moderate price. The new enamel was developed in response to a demand for a uniform, high-quality coating for toys, kitchenware, outdoor furniture and other products subjected to extra wear and tear.

Laundry Grease Cleaner

Solvent emulsion type cleaner replaces soap in heavy duty laundering.

Erustolax, a new solvent emulsion type cleaner primarily designed for the removal of extremely oily and greasy soil found in overalls and wiping rags, is now being offered by the Laundry and Dry Cleaning Department of the Pennsylvania Salt Manufacturing Co., 1000 Widener Building, Philadelphia 7, Pa.

In addition to being recommended for all laundries with heavy grease soil problems, tests have indicated the new product will find wide application in linen supply washing.

Erustolax is designed so that all soap is eliminated when it is used in heavy duty laundering. One of its unusual features is that it gives off no strong, irritating odors or fumes, thereby improving working conditions in laundry washrooms and finishing departments. It is packaged in five-gallon cans and 50-gallon steel drums.

Surfacing Material

Rubber compound resists kerosene type fuel spills, protects airfield runways.

A new surfacing material that promises to protect airfield runways from the damaging effects of fuel spilled by jet planes, was revealed recently at Wright-Patterson Field, Dayton, O., during an Armed Forces Day exhibit.

Developed by United States Rubber Co. and called Aero-Sealz, it is a solvent resistant rubber compound, which when mixed with tar produces a tough, durable surface that resists the dissolving effects of kerosene type fuel used by jet planes. Damage caused by this fuel is a major problem in modern airport construction and maintenance

due to its lower rate of evaporation compared with high octane gas used by regular planes.

Besides protecting pavement surfaces, Aero-Sealz shows promise used as a filler to seal joints between concrete slabs in highways and runways.

Electrolytic Cleaner

New material for plating industry is versatile.

The DuBois Co., Cincinnati 3, Ohio, has brought out a new electrolytic cleaner called Alkon. The new product's versatility makes it of interest to platers.

It is suitable for either direct or reverse current cleaning of both ferrous and cuprous metals. It is said to combine all the attributes of a hot tank cleaner—wetting, emulsification, soil suspension, hard water control—with the necessary electrical properties. One of its features is foam control to eliminate solution spattering and minor explosions. Relatively low using concentrations, and long solution life give economical cleaning.

Resin Glue Hardeners

Long assembly time, yet quick curing cycle possible with new hardeners.

Synvar Corp., Wilmington, Del., has added new hardeners to its present line for urea-formaldehyde resin glues. These three hardeners, #182, #187 and #188, are designed for hot press work. These hardeners are in liquid form and have a very fast curing cycle at a temperature of 240° F. or above, and yet permit a very long assembly time and give a long pot life to the esin mixture. They are especially helpful in eliminating or reducing the formaldehyde odor noticeable during the hot press operation. All these hardeners work with straight as well as with extended resins.

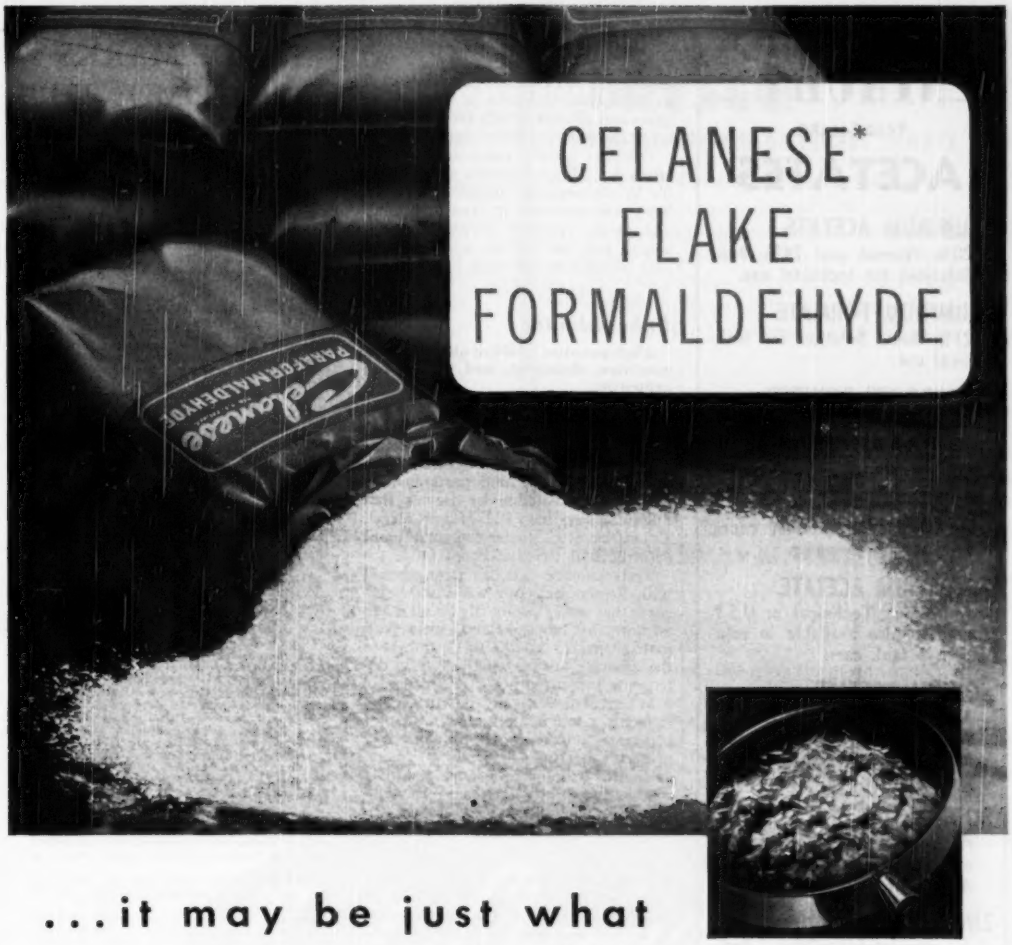
Hardener 187 has the special feature of adjusting the consistency of the flour extension, regardless of its character and origin. Hardener 188 improves water resistance of the bond.

A new hardener has also been developed for use with the Taylor Panel-Flo Splicer Machine. This hardener gives a fast cure and yet gives the mixture a pot life of at least two hours. The designation of this new hardener is #275.

Floor Enamels

Coatings for concrete resist corrosive materials, mold, wear.

Hysol Concrete Floor Enamels, new synthetic resin-based materials for protecting concrete surfaces from acids and other chemicals, have recently been developed by Houghton Laboratories, Olean, N. Y. Claimed to offer outstanding abrasion and wear-resistance under all circumstances, these chemically inert enamels resist the action of



. . . it may be just what your processing needs

Are you searching for processing shortcuts? Flake Formaldehyde, developed by Celanese, may supply the answer to your problem as it has for many processors in fields ranging from modified and high solids resins to fine chemical synthesis.

Flake Formaldehyde is formaldehyde in its most available and easily stored form. Its low water content—less than 9%—is a necessity where almost anhydrous conditions are required and a time and money saver when water must be removed from the final product.

In addition, Celanese* Flake Formaldehyde eliminates the need for heated formalin storage tanks. It is available in multiwall bags and fibre drums . . . offers easy, dustless handling.

We'd like to talk to you about your particular problems . . . tell you about other advantages that flake has to offer. Call your Celanese representative, or write: Celanese Corporation of America, Chemical Division, Dept. 52-G, 180 Madison Ave., New York 16.

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

ACIDS • ALCOHOLS • ALDEHYDES • GLYCOLS • KETONES • PLASTICIZERS • SOLVENTS

July, 1950

mold growth, gases and chemicals such as 10% concentrations of commercial acids and alkalies which ordinarily deteriorate concrete floors and walls.

Odorless and non-contaminating when dry, Hysol Enamels are applicable by conventional brushing methods. They are available in iron red, gray and green. Average coverage is 350 square feet per gallon, with a single coat satisfactory for most installations.

Lube Additive

High-pressure additive also has anti-corrosion, detergent, and penetrating properties.

A new "friction-proof" lubricating additive that prolongs the life and increases the efficiency of diesel, gasoline and electric motors and engines as well as all moving machine parts is now being made available by Power Ball Oil Company, Inc., 911 Huger Street, Columbia, S. C., under the trade name "Power Ball Friction-Proof Oil."

Tests indicate that oils strengthened with Power Ball can withstand pressures that would ordinarily break down an untreated lubricant and "freeze" all moving parts. Additional features of the additive are its rust-proofing, detergent, and penetrating properties.

When used with any oil or grease, it forms a tough lubricating film that penetrates into the pores of metal and protects the surface from corrosion as well as scuffing and scoring. Moreover, the additive increases the efficiency of all cutting oils and prolongs the life of cutting tools.

• A new use for the General Electric Chemical Department's silicones has been found in the preparation of a new **solution for treating concrete** and cement block buildings. Known as Stopall Type C and CP, and manufactured by the Stopall Waterproofing Manufacturers, Inc., Kalamazoo, Mich., the new solution, which contains General Electric silicones, is used for keeping water out of concrete and cinder blocks, porous stucco, and sandlime brick. Its use permits oil painting on concrete with lasting results. One hundred to 150 square feet per gallon may be covered.

• The Electro Chemical Supply & Engineering Co., 750 Broad St., Emmaus, Pa., has a new type of thermosetting resin used as an acid and alkali-proof **cement or coating**, called Duron. It will adhere without the use of a primer to concrete or metal, and is self-hardening at room temperature. Duron is used in the manufacture of acid- and alkali-proof cements for joining brick and tile, as a coating for concrete, steel, or wood and as an impregnant for wood.

TRADE MARKS OF THE MONTH

From Official Gazette—Vol. 631, Nos. 2, 3, 4 and Vol. 632, Nos. 1, 2, 3.

Sprite. Liquid synthetic detergent comprising a blend of anionic and non-ionic components for household and general cleaning purposes. 558,172. H. M. Sinclair, Jr.

LATHANOL. Alkali sulfonate for use as surface-active component in manufacture of dentifrices and other toilet preparations. 558,768. Allied Chemical & Dye Corp.

Moth-o-Matic. Moth-killing and preventive materials. 559,179. Puro Co., Inc.

WORKMASTER. Cold water sizing for use on walls before applying wallpaper or Kalsomine. 559,328. Sears, Roebuck and Co.

(Symbol) Ground or pulverized limestone for use as fertilizer, soil conditioner, and plant food. 559,621. Limestone Products Corp. of America.

DENSITONE. Fluorescent lacquer retouching material for retouching and outlining photographic color copy. 559,713. Kemart Corp.

Defender. Photographic chemicals. 560,002. E. I. du Pont de Nemours & Co.

SWEEPING THE NATION. Sweeping compounds. 560,313. Badger Plug Co.

DULHUE. Flat wall paint, ready mixed and sold in liquid form. 560,541. Chicago Paints, Inc.

SCHOLLER-LYTE. Chemical chlorination agents for use in chlorinating wool. 560,573. Scholler Brothers, Inc.

Enchantment. Shampoo and cold cream. 560,868. De Pree Co.

PUMEXOL. Auxiliary agent in the textile industry; anti-foaming agent. 560,974. Ciba Ltd.

NEOSYN. Coal tar colors. 560,978. Ciba Ltd.

VIBATEX. Textile auxiliary agents, tanning agents. 560,987. Ciba Ltd.

"1000 SPAR". Varnish. 561,157. Standard Varnish Works

COMPADOL. Lubricating oil for knitting machines. 561,309. Compadol Sales.

KUHLS. Fungistatic and insecticidal wood preservative. 561,314. H. B. Fred Kuhls.

NUCHAR. Activated and unactivated carbons and carbonaceous materials for use in filtering, clarifying and decolorizing liquids. 561,421. West Virginia Pulp and Paper Co.

Payson. Paints, varnishes, paint enamels, and colors-in-oil. 561,940. Payson Corp.

SEQUESTRENE. Cation exchange materials which are soluble in water or water solutions of alkalies. 561,971. Alrose Chemical Co.

TREZEIN. Water-soluble protein hydrolysis products useful for adhesives and for incorporating with leather. 562,103. Union Starch & Refining Co.

KRAKNO. Paint fillers for use on wood, metal, or canvas surfaces. 562,130. R. F. Johnston Paint Co.

Trueness. Mixed paints for exterior and interior walls, paint colors in oil, varnish type wood fillers, japan, colors in japan, varnishes, varnish stains, oil stains, and white lead. 562,256. Foy Paint Co., Inc.

MYVEROL. Surface-active conditioning agents—namely, monoesters of polyhydric alcohols for use in certain foods. 562,546. Eastman Kodak Co.

RAMCO. Insecticides; disinfectants; chemical bowl cleaners; drain pipe opener; cattle fly spray; moth crystals; and rodenticide. 562,640. R. A. Myers & Co.

INKOL. Refined naphthas for general industrial use. 563,147. Anderson-Prichard Oil Corp.

UNION. Dry cleaning fluid. 564,071. Union Oil Co. of Calif.

GENIPHENE. Paraciticides, particularly insecticides. 564,592. Allied Chemical & Dye Corp.

(Symbol) Chemical products and chemical intermediates—including gas odorants, wetting agents, naphthenate dryers etc. 564,734. Oronite Chemical Co.

XYLITE. Thermosetting synthetic plastic and plasticizers for same. 565,201. Paterson Plastics Co.

PLANTERS. Agricultural insecticides and fungicides. 565,651. Planters Chemical Corp.

SCAN. Industrial polishing wax for floors, walls, woodwork, furniture, and other similar surfaces. 565,906. S. V. Cain, Inc.

WHITE-O. Car wash. 566,057. White-O Car Wash Sales Corp.

ATMUL. Emulsifying, wetting, and dispersing agents being surface active esters and ethers of polyhydric alcohols. 566,063. Atlas Power Co.

Nu-Way PROFESSIONAL TYPE BLEACH. Compound for disinfecting, bleaching, and deodorizing, having incidental cleansing properties. 566,110. Nu-Way Products Co.

GUYANDOT RED. Pigments for use in the manufacture of protective coatings. 566,364. Standard Ultramarine Co.

DRYMET*

THE ECONOMICAL DETERGENT SILICATE

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both Na_2O (alkalinity) and SiO_2 (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

DRYSEQ*

THE ALL-PURPOSE DETERGENT SILICATE

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% Na_2O—making it an economical base material for compounding.

DRYORTH*

THE HEAVY-DUTY DETERGENT SILICATE

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% Na_2O, which may also be used as an economical constituent of high pH cleaning compounds.

CRYSTAMET*

THE MEDIUM pH DETERGENT SILICATE

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble—chemically stable—easy to handle. Can be used on medium pH jobs.

Cowles Chemicals

We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.

PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS

* REG. U. S. PAT. OFF.

COWLES CHEMICAL COMPANY

HEAVY CHEMICAL DEPARTMENT • CLEVELAND 3, OHIO

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*LOADING

Sulphur intended for vessel shipment is brought to Galveston by rail from the mines at Newgulf. It is transferred directly from cars or from storage bins to the vessel.

The loading plant consists of two parallel storage bins spaced far enough apart to allow room for railroad tracks, tracks for the hoppers and cranes, and an endless conveyor belt. The belt along the center line between the bins is straddled by four cranes and their movable hoppers.

The cranes pick up the sulphur from the bins or cars and discharge into the hoppers, which automatically feed the belt. It is weighed while on this moving belt. After weighing it is discharged onto a smaller belt which in turn discharges through a cylindrical telescopic spout directly into the vessel's hold.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.

TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

TRADE MARKS——

WHINK. Powdered soaps, liquid spot removers for fabrics and liquid rust removers for fabrics. 566,781. Whink Products Co.

(Symbol) Shampoo. 567,012. Gillette Safety Razor Co.

SOIL SULPHAID. Mineral fertilizer. 567,164. Wyoming Sulphaid Co.

ATAX. Emulsifying, wetting and dispersing agents being surface active esters and ethers of polyhydric alcohols. 567,750. Atlas Powder Co.

CITIES SERVICE. Alcohols, aldehydes, methyl acetone solvents, propane and butane; anti-freeze preparations; automobile radiator treating compounds; cigar and cigarette lighter fuels; fluids for hydraulic shock absorbers and brake systems; insecticides and fungicides; and chemical rust removers and preventatives. 567,758. Cities Service Oil Co.

PLEX. Combination of enzymes used to convert insoluble starches and proteins to a soluble form to facilitate removal from fabrics in dry cleaning operations. 568,002. Patek and Co.

carol douglas. Creme hair rinse. 568,010. Gillette Safety Razor Co.

SEALTEX. Strip material of natural and synthetic rubber and compositions thereof, for use by shoe repairmen for top lifting and the like. 568,347. Cat's Paw Rubber Co., Inc.

MYRJ. Emulsifying agents in the nature of polyoxyethylene derivatives of fatty acids for use in food products. 568,568. Atlas Powder Co.

Fentone. Tonic and shampoo for the treatment of the hair and scalp, cosmetic astringents, etc. 568,722. Catherine C. Fenton

PAINT SERVICE SINCE 1869. House paints, various interior paints and varnishes, and oils, and solvents for use in paints. 568,884. S. Wolf's Sons.

DIMYRJ. Emulsifying, wetting, and dispersing agents, being esters of fatty acids. 568,992. Atlas Powder Co.

KOMYRJ. Emulsifying, wetting, and dispersing agents, being esters of fatty acids. 568,993. Atlas Powder Co.

VASDA. Outside wall and trim paints. 569,446. R. F. Johnston Paint Co.

Whiterightoff. Cleaner for white shoes. 569,757. George J. Kelly, Inc.

EAGLE-PICHER. Granular siliceous material for application to floors for absorbing oil, water, and other liquids. 569,831. Eagle-Picher Co.

CUIR du CANADA. Toilet soap. 569,865. Les Parfums De Dana, Inc.

5013. Normally liquid phthalic acid ester product for use as plasticizer and resin compounding material and as anti-foaming agent. 570,149. Allied Chemical & Dye Corp.

TRU-WAY. Liquid starch. 570,188. Chemical & Industrial Labs., Inc.

AMAMI. Shampoos, brilliantine, antiseptic hair dressing, skin creams, etc. 570,223. Prichard & Constance (Amami) Inc.

SUREX. Chemical paint and varnish remover. 570,382. Schaik Chemical Co.

PENFLUOR. Insecticides. 570,719. Pennsylvania Salt Mfg. Co.

CITRASEPTIC. Antiseptic powder. 570,810. Zonite Products Corp.

ALCIAN. Dyestuffs and coloring matters. 570,853. Imperial Chemical Industries Ltd.

ZENITH. For paints and similar products. 571,151. Marshall-Wells Co.

BLACK FLAG BANDERA NEGRA. Insecticides and disinfectants. 571,197. Boyle-Midway Inc.

A-B-C Shoe polishes, blackings, cleansers; leather dressings and preservatives. 571,327. Griffin Mfg. Co., Inc.

INVADINE. Substance used as emulsifying agent and solvent and for textile wetting agent. 571,951. Ciba Ltd.

PYROGENE. Coal-tar colors. 571,953. Ciba Ltd.

ROSANTHRENE. Coal-tar colors. 571,954. Ciba Ltd.

Dee Aitch. Insecticides, fungicides, herbicides and rodenticides. 571,956. Daly-Herring Co.

AERODUX. Synthetic resinous adhesives for metals, glass, ceramics, and/or plastics. 572,015. Ciba Ltd.

AEROLITE. Glues, adhesives, and binding agents composed principally of synthetic resins for industrial purposes. 572,017. Ciba Ltd.

Savablaze. Non-inflamable organic solvent type paint remover. 572,057. Savogran Co.

METEX. Chemicals for cleaning metals and chemicals for cleaning textiles and liquid compounds used in and incidental to metal finishing operations. 572,311. MacDermid Inc.

AIREX. Wicktype household deodorant. 572,331. Selig Co., Inc.

REX. Room deodorant. 572,377. Rex Research Corp.

Red-Skin. Strippable liquid plastic coating composition. 572,488. Dennis Chemical Co., Inc.

REY-NO-MOLD. Aluminum paste pigment, for use in paints. 572,586. Reynolds Metals Co.

LIK. Liquid floor cleaner. 572,928. Mars Chemical Co.

METRIAD. Antibacterial preparation. 573,271. Sharp & Dohme, Inc.

ARTIC BREEZE. Anti-freeze solution. 573,953. Lac Chemicals, Inc.

(Turn to page 150)

NEW PRODUCTS & PROCESSES

Polymerization Aid

Diox 7 promotes emulsion polymerization of GR-S and vinyls.

Diox *7*, *tert*-butylisopropylbenzene hydroperoxide, in a 50 per cent solution with the parent hydrocarbon material is now available in semi-commercial quantities from the research and development department of Phillips Petroleum Co., Bartlesville, Okla.

This new chemical (*CI, March 1949, p. 383*) has been effectively utilized as an oxidant or "initiator" to promote rapid emulsion polymerization of butadiene and styrene with redox and peroxamine recipes such as those employing ferrous pyrophosphate and polyamines. Diox *7* is more active than other commercially available hydroperoxides used in rubber polymerization at low temperatures; consequently, less is required to initiate polymerization. Bulk polymerization of vinyl type monomers also is accelerated by Diox *7*.

tert-Butylisopropylbenzene hydroperoxide in the pure state is a white crystalline compound. The 50 per cent solution now being marketed is semi-solid at room temperature but completely liquid above 110 F. For a hydroperoxide, it can be recommended for its high relative stability and satisfactory solubility in certain organic solvents. Both the hydroperoxide and the solvent have low volatility and the solution has a flash point of about 300 F.

Thermosetting Resin

Properties of new, tough resin intermediate between those of rubber and rigid plastic.

Development of a tough new plastic is reported by United States Rubber Co., New York 20, N. Y. (*CI Newsletter, May 1950*).

The new plastic, bridging the gap between soft rubber and hard rubber, fulfills a need for a high-strength material which is resistant to abrasion and chemicals and at the same time can be produced in varying degrees of flexibility ranging between elastic soft rubber on one hand and brittle hard rubber on the other.

Gears made of the new plastic have been operating for more than a year in applications where conventional metal gears have failed within a few weeks (*see cut*).

It has demonstrated remarkable toughness, resistance to abrasion and resistance to the deteriorating effects of oils, solvents, acids and mild alkalis. Light in weight and extremely stable at high temperatures, it has good resistance to fire and its high dielectric strength makes it a good electrical insulator. It is thermosetting.

Enrup gear* (right) *has operated for 9 months in grinding wheel finishing lathe. Metal gear* (left) *operated for only 3 months in the same service. Reason for the rapid deterioration of the metal gear was the abrasive dust from grinding wheels which penetrated gear train. Enrup's high abrasive resistance makes it particularly suitable for this type of application.

Having an impact strength superior to most plastic materials now being marketed, it can be molded economically in complicated shapes by either compression or transfer methods.

(Enrup is available in a wide range of hardnesses with a corresponding variation in other characteristics. The values listed are for a typical compound.)

Specific Gravity	1.3
Tensile Strength, psi	4,200
Hardness Rockwell M	65
Impact Strength, ft. lb./in. notch	1.3
Modulus of Elasticity	180,000
Water Absorption, % gain in 24 hr.	0.3
Resistance to Chemicals	
Acid, Cold	Excellent
Acid, Hot	Good except oxidizing
Alkali, Cold	Good
Alkali, Hot	Fair
Solvents	Excellent
Gasoline	Good
Fire Resistance	Fair
Safe Operating Temperature	180° to 250°F
Electrical Properties	
Dielectric Strength, volts/mil	500
Dielectric Constant	9
Power Factor	0.20
Arc Resistance	Good

The new plastic, to be marketed under the trade name "Enrup" by the company's mechanical goods division, is now in production in two company plants located at Fort Wayne, Ind., and Passaic, N. J. Ample manufacturing capacity is available since it can be produced on standard rubber processing equipment.

It is available in the form of sheets, rods, tubes, gear blanks and as molded parts.

Accelerator

Liquid accelerator miscible with water gives good results with natural and synthetic latices.

Sharples Chemicals, Inc., will market a new liquid accelerator for use in latex formulations under the trademark "Merac."

It can be employed in natural and synthetic latices. It gives excellent results in natural rubber or GR-S latex compounds cured over a range extending from room temperature to practical latex curing temperatures. Films vulcanized with this accelerator are characterized by high tensile strength and excellent aging properties.

Since Merac is a liquid miscible with water, it can be added directly to the latex. When diluted, Merac has a low viscosity which affords easy and rapid addition to the latex with a minimum of mixing to obtain a uniform formulation. The use of Merac eliminates the necessity of dispersing dry accelerators prior to addition to the latex. Order of addition of Merac to the latex is not critical, provided it is not added with the zinc oxide dispersion. It may be added alone or with other latex compounding ingredients, as long as it is not combined with the zinc oxide prior to addition to the latex.

Natural latex formulations accelerated with Merac have good stability and show a minimum change in viscosity on storage..

Merac is a deep red to brown liquid of characteristic odor, miscible with water, and soluble in alcohol.

Samples and technical information are available from Sharples Chemicals, Inc., 123 South Broad Street, Philadelphia 9, Pa., and Sharples sales offices.

Plasticizer

Low-cost polymeric plasticizer can be used in plastisols.

Although polymeric plasticizers contribute desirable permanence to vinyl compounds, their high viscosity has sometimes limited their use in plastisols. Recent laboratory work indicates, however, that vinyl plastisols of readily workable, stable viscosity can be prepared from the newest of the Paraplex G-series plasticizers, G-60.

Laboratories of Resinous Products Division of Rohm & Haas Co., Philadelphia, tested plastisols containing Paraplex G-60. Batches of various sizes were prepared, and viscosity was measured at the outset and after aging one, seven, and 28 days. The initial viscosity of the batches was low—comparable with that of batches prepared with phthal-

EVERY REFINEMENT IN MANUFACTURING AND HANDLING FOR SAFEGUARDING YOUR PRODUCT QUALITY

Meticulous care in production and shipping makes Columbia Caustic Soda a high grade, dependable product . . . ideal for your most exacting use.

Columbia's patented purification process is a unique method which converts diaphragm cell electrolytic liquor to Caustic Soda of exceptional purity.

This purity is maintained throughout loading, transporting, and delivery . . . your assurance that Columbia Caustic Soda will always meet your requirements. Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pennsylvania.

COLUMBIA *Pioneer in Better Transportation and Handling of Liquid Caustic Soda*

Fusion welded car, eliminates rivets as a possible source of leaks and metallic contamination.

Tank car insulation prevents freezing except in the most extreme cases.

Patented lining in tank cars and barges prevents metallic pickup in transit.

Improved tank car heating equipment facilitates unloading when severe weather conditions are encountered.

Patented proportioning and cooling system simplifies unloading of 73%.

COLUMBIA CAUSTIC SODA IS SUPPLIED IN THE FOLLOWING FORMS:

Liquid 73% or 50%, Solid, Flake.

COLUMBIA CHEMICALS

CHICAGO • MINNEAPOLIS • BOSTON
NEW YORK • CINCINNATI

ST. LOUIS • CHARLOTTE • PITTSBURGH
CLEVELAND • PHILADELPHIA

PAINT • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

ate plasticizers included in the test. The thixotropy of the G-60 batches was extremely low. No significant change in the initial viscosity of 24,000 centipoises (Brookfield, No. 4 spindle, 6 rpm) occurred during aging. Films cast from the plastisols were extremely resistant to loss of plasticizer by volatility or by water extraction. In retaining good color despite prolonged exposure to 250° F., the films corroborated reports that G-60 exerts an uncommon stabilizing effect on compounds exposed to heat in processing or service.

Paraplex G-60—low cost plasticizer announced recently—is said to combine plasticizing efficiency, light color and clarity, and compatibility with solution grade vinyls. In chlorinated hydrocarbons, chlorinated rubber and nitrocellulose, G-60 acts as a combination stabilizer and plasticizer.

Isobutylamines

Mono- and diisobutylamine are available on semicommercial basis.

Sharples Chemicals has made isobutylamine and diisobutylamine available for the first time in semicommercial quantities. Commercial production can be initiated if demand warrants.

These two chemicals have been suggested in technical and patent literature as intermediates for use in the following industries: agriculture, petroleum, pharmaceutical, plastics, rubber, and textile. Properties are:

	Isobutylamine	*Diisobutylamine*
Formula	$(CH_3)_2$ $CHCH_2NH_2$	$[(CH_3)_2$ $CHCH_2]_2NH$
Mol. Wt. (Calc'd)	73.1	129.2
Color	Water-white	Water-white
Sp. Gr. @ 20°/20°C.	0.73–0.74	0.74–0.75
% Amine (min.)	97	98
Distillation:		
I.B.P. (min.)	64°C.	——
95% between	64–71°C.	134–141°C.
F.B.P.	75°C.	——
Flash Point	<20°F.*	85°F.*
Viscosity at 60°C.	0.33 centipoise	0.44 centipoise

* Literature values.

Samples and prices are available from Sharples Chemicals, Inc., 123 South Broad Street, Philadelphia 9, Pa.

Anti-Rust Pigments

Trilead orthophosphate and dilead pyrophosphate are inert to organic acids.

Two new rust inhibitive white lead pigments, non-reactive toward vehicles containing free carboxyl groups, have been introduced to the paint and varnish industry.

Monsanto Chemical Co., St. Louis, Mo., is now producing commercial quantities of trilead orthophosphate and dilead pyrophosphate. They are said to be among the few rust inhibitive materials which are non-reactive with solution coatings composed of a polyvinyl chloride-acetate copolymer modified with a dicarboxylic acid.

Because of free carboxyl groups, this resin reacts readily with most conventional primer pigments, particularly with corrosion-inhibiting types, such as the zinc and lead chromates and red lead, resulting in the entire composition setting up in an unbreakable gel.

When lead phosphates are used the gelation does not occur, the company said. In addition, the lead phosphates appear to inhibit corrosion. They do not function, however, as heat and light stabilizers.

The products are currently available in 100-pound fiber drums.

Phenolics

Durez offers three new impact-type phenolic molding materials.

Three new phenolic molding compounds have recently been placed on the market by Durez Plastics & Chemicals, Inc., North Tonawanda, New York. All three fall into the impact type classification and provide either properties or production performance heretofore unavailable. They are Durez 13537 Natural and Durez 14482 Black, both high-impact, fabric-filled materials, and Durez 14658 Black, a nitrile rubber-bearing, wood-flour-filled material.

The two new fabric-filled materials utilize two-step resins, and therefore have greatly improved flow properties and finish and are less critical when electronically preheated.

Durez 13537 Natural has an impact strength of 1.4 foot-pounds per inch on the Izod scale. Its unusually good flow properties allow it to be either compression or plunger molded. Durez 14482 Black is similar to Durez 13537 but has almost double the impact strength (2.2 foot-pounds per inch). Molding properties are not appreciably affected.

Durez 14658 Black has the moldability of general-purpose materials, but because of its nitrile rubber content, it possesses improved impact strength and shock resistance. Its low modulus of elasticity (0.6×10^6 pounds per square inch in tension) allows it to be used in thin sections around metal inserts. Molded parts are capable of standing repeated abuse without failure. The material can be plunger or compression molded and has good surface appearance.

Complete specifications on these new materials are available from the company on request.

Tetrazolium Salts

Montclair Research Corp. offers three tetrazolium compounds for biological research.

Montclair Research Corporation, 4 Cherry St., Montclair, N. J., has recently entered the field of fine chemical production for biological and medical research and is producing a number of tetrazolium salts. The salts available at present are 2,3,5-triphenyl tetrazolium chloride, neotetrazolium chloride [p,p'-diphenylene-bis-2-(3,5-diphenyl tetrazolium chloride)] and neotetrazolium phosphate.

These water-soluble compounds are reduced by living cells to stable colored derivatives. The neotetrazolium salts, which are colored purple to black in the reduced form, have been used extensively in histological research since the produced color contrasts distinctly with blood-containing tissue. The triphenyl tetrazolium chloride yields a deep red color on reduction and has been used successfully as a means of determining the germinating ability of seeds.

Full information on these salts is available on writing to the company or to Amend Drug and Chemical Co., 117-119 E. 24th St., New York 10, N. Y., who are the distributing agents.

High-P Alloys

Nickel and cobalt alloys with 10-15% phosphorus are hard, bright, corrosion-resistant.

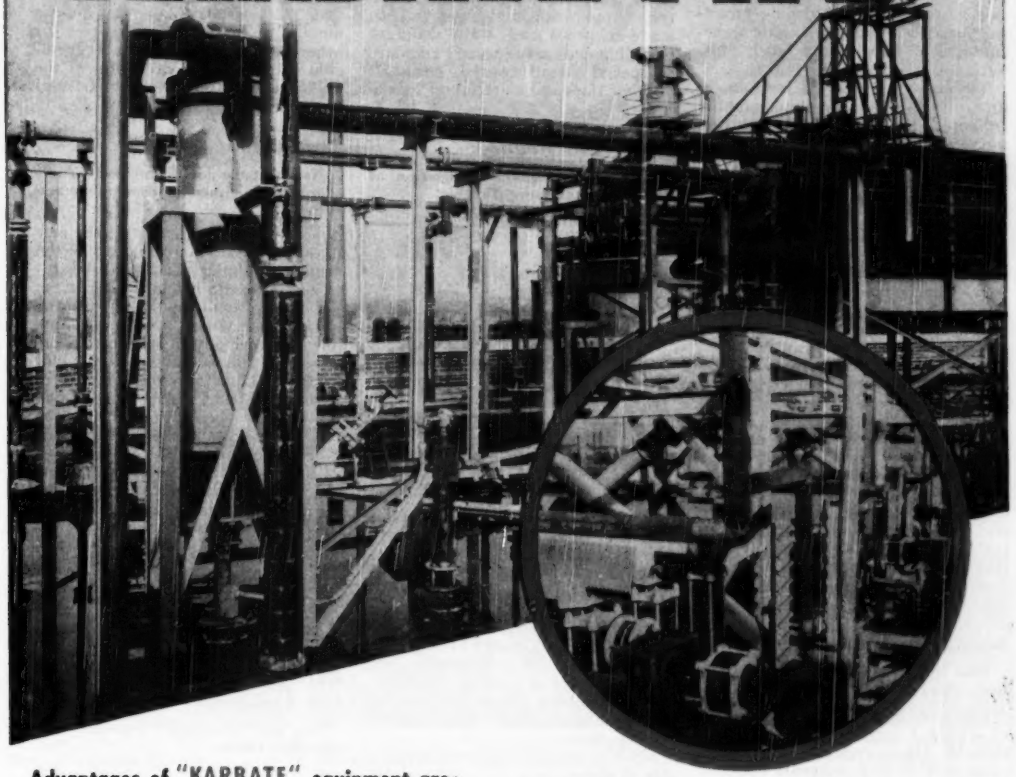
A commercially feasible method for producing electrodeposits of cobalt or nickel alloyed with as much as 15 per cent of phosphorus has been developed at the National Bureau of Standards. The new phosphorus alloys are more easily deposited than chromium and are very hard, corrosion-resistant, and bright. They should thus be of value for many of the applications in which chromium plate is now used to obtain a hard, wear-resistant surface or a decorative finish.

Plating baths for depositing the phosphorus alloys are rather simply prepared, consisting of common nickel or cobalt salts such as the sulfate or chloride, to which is added phosphorous acid as a source of phosphorus in the deposit. The baths are operated at a low pH—between 0.5 and 1.5 depending on the composition. To maintain the desired acidity in the cathode film, the solution must be buffered. The Bureau has found that phosphoric acid is one

(*Turn to page 116*)

For any or all corrosive jobs...

"KARBATE" PIPE!



Advantages of "KARBATE" equipment are:

- **Both acid-resistant and alkali-resistant**
- **Light in weight, easy to machine and assemble**
- **No metallic contamination of product**
- **Immune to thermal shock**
- **Very high thermal conductivity**

WHETHER your corrosion problem involves a little 100-foot "nuisance" pipe line . . . or the outfitting of a complete chemical plant, "Karbate" impervious graphite equipment offers an economical and efficient solution. "Karbate" pipe, fittings, and related equipment are the best obtainable for conveying, processing or storing practically all corrosive fluids.

For complete details, write to National Carbon Division, Dept. CI

NOW... double light at no extra cost!

Specify the new and improved "Eveready" 1050 flashlight battery and you get more than double the usable brilliant white light for critical uses than is available from any other flashlight battery National Carbon has ever made. The battery is leakproof .... **NO METAL CAN TO LEAK OR CORRODE!**

The terms "Karbate" and "Eveready" are registered trade-marks of

NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago Dallas, Kansas City, New York, Pittsburgh, San Francisco
Foreign Department: New York, U. S. A.

NEW EQUIPMENT

Recorder

New recorder records transmitter output in terms of process variable being measured.

The Transet recorder of Taylor Instrument Cos., Rochester 1, N. Y., is a new miniature recording-receiving instrument for pneumatic transmission of flow, liquid level, pressure and temperature.

The new recorder is a compact unit, ideally suited for either graphic or conventional panels. It fits into a panel opening of 3⅞" x 4½" with a flange measurement of 4⅜" x 5".

It records the transmitter output in terms of the process variable measured. The 3"-wide chart travels from right to left, 1-inch per hour, to produce a record similar to one which would be plotted by an engineer. Charts may be torn off from left side as needed. Electrically driven chart mechanism is designed to pull out like a camera.

Four forms (all receivers 3 to 15 psi) are available: (1) one process record, set-point indication, set-point adjustment, valve position indication and automatic-manual unit for use with controllers located in the control house; (2) one process record, set-point indication, set-point adjustment, valve position indication and automatic-manual unit for use with field mounted controllers; (3) one process record, valve position indication and remote manual valve loading; (4) one process record only.

Insulation

New 85% magnesia insulation has lower density than conventional type.

The new "Super-Light" insulation of Philip Carey Mfg. Co., Cincinnati 15, Ohio, contains 85% magnesia and 10-15% asbestos fibre. It is cast into precision molds not filter-molded in the conventional manner. Filter molding gives a product with uncertain dimensions which requires trimming to desired dimensions and has a density of 13-17 pounds per cubic foot. Density of the new type is 9.5-10.5 pounds per cubic foot.

The new product comes in sizes ranging from ⅜" to 6" for copper tubing; ¼" to 18" for iron pipe; and in thicknesses from 1" to 4".

Sleeve Valve

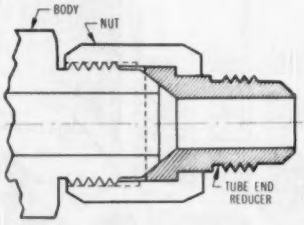
New valve uses neoprene "O" ring for sealing.

The J O Mfg. Co., South Gate, Calif., has introduced a new line of stainless steel valves and hose couplings in 1, 1½ and 2" sizes. The valves are seatless, and make use of neoprene "O" rings for sealing. Operating pressures to 100 psi. The valve is leak-proof with no metal to metal contact, quick opening to full flow, sanitary, self-flushing, positive locking, and self-lubricating. This valve can be used for both regulation and control, and can be supplied completely finished for sanitary application. Present valves made of #304 and #316 stainless. Coupling ends made to any standard or special thread desired. Available in other sizes and material on special order.

Tube End Reducer

New reducer makes application of Parker fittings more flexible.

A new tube end reducer for use with Parker Triple-lok fittings to



step down to smaller tube sizes is available from The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio. The new reducer greatly broadens the range of reducing sizes because it can be used to convert any standard Triple-lok fitting (37° flare, steel) to a reducing type. Attached with the standard nut to the fitting tube end, the reducer provides a flared nose for the smaller tube size, and threads for the smaller nut.

Made in steel, the reducer is available in eight sizes: ⅜", ½" and ¾" to ¼" or to ⅜" tube; ¾" to ½" and 1" to ¾" tube. Similarly, a brass tube end reducer, in the same sizes, is available for use with the Parker line of Triple brass fittings used with copper tubing.

Gage Valves

New gage valves permit turning of the gage to any desired angle.

Three new Jerguson double union gage valves are available from Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass.

With union connection to both the gage and the tank or vessel, it is possible to turn the gage in any desired angle or remove it without removing the valves or draining the liquid from the vessel.

New valves added to the popular No. 64 valve include two offset valves, No. 66-U and No. 46-U, and a steam-jacketed globe type valve, the No. 93-U.

The two offset valves are designed with a body which has gage and vent or drain connections, offset ⅞" so the interior of the flat glass gage may be cleaned without removal of the gage. The No. 93-U valve is a steam jacketed globe valve and is available with or without a stainless steel ball check safety shutoff.

All new valves are available with tailpieces ½" or ¾" male, or ½" female; and are available in various metals to withstand corrosive or other conditions. All have regrindable seats with the exception of the 46-U which is of a lower price construction.

Agitator

New agitator for drums and barrels adaptable to either hand or power agitation.

A primary feature of the new American-Ingraham agitator of the American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa., is the driving spud on the end of the agitator bar which makes it adaptable to either power or hand operation. It is said that this agitator will produce a laboratory mix in as little as ten minutes. This speed is due to the various planes of the agitator bar which are turned at angles. When in motion, the settled material is raised from the drum bottom and mixed with the contents. This bar also provides a sweeping arm and chime-scraper to loosen material from the bottom and the chime of the drum. The agitator is securely fastened in position in both the bottom and the top of the drum to prevent it from becoming dislodged and useless in shipping or handling.

Refrigerant Gas Condenser

New unit is designed especially for use with Freon.

A new Aeropass refrigerant gas condenser is being produced by Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y. Designated as the 5800 series, the new condenser is designed especially for use with Freon in industrial refrigerating applications.

The series consists of five standard units ranging in capacity from ten to fifty tons refrigeration at 105° F. Freon condensing temperature and 74° F. atmospheric wet bulb temperature. The smallest unit has casing dimensions of 31" x 24" x 85¼" in height and the largest is 94" x 30" x 93¼" in height. Casing, fan and eliminator construction is galvanized steel. Condensing coils for Freon are copper tube, with copper fin or hot galvanized steel tube and fin. Weatherproof construction for outdoor installation is available. Operating on the evaporative principle, the condenser saves 95% of

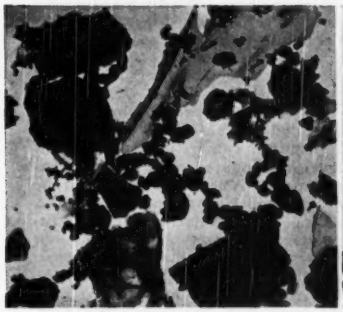
CHEMICO

P-A VENTURI GAS SCRUBBER

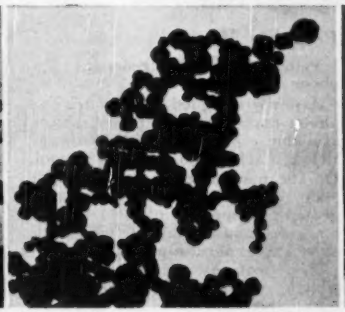
offers HIGH *efficiency*

AT LOW COST

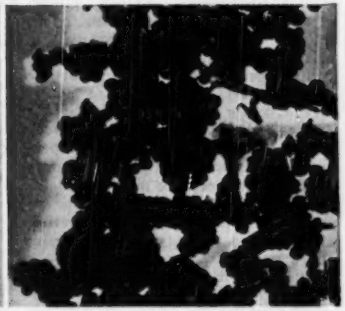
Typical efficiencies in the removal of sub-micron dusts



Activated carbon dust from rotary dryer. P-A Venturi Efficiency **98%**



Iron oxide dust from oxygen-lanced open hearth. P-A Venturi Efficiency . **99%**



Lead oxide fume from scrap lead blast furnace. P-A Venturi Efficiency . **95%**

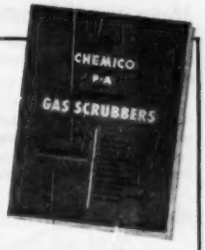
The Electron Micrographs above show the type of dust particles the Chemico P-A Venturi Scrubber removes almost completely from industrial gases. Equally important, the price of efficient P-A Venturi performance is *low* . . . in initial cost of the equipment, in maintenance and water requirements.

For gas scrubbing, for recovery of valuable metals and chemicals or for absorption of odors, it will pay you to investigate the Chemico P-A Venturi Scrubber.

NEW 8-PAGE BULLETIN

Fully illustrated Bulletin M-102 gives performance data and case histories on both the Chemico P-A Venturi and Cyclonic Gas Scrubbers.

Write for your copy today.



CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

488 MADISON AVENUE, NEW YORK 22, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE
CYANAMID PRODUCTS, LTD., LONDON W. C. 2 ENGLAND
CABLES: CHEMICONST, NEW YORK

CC 208

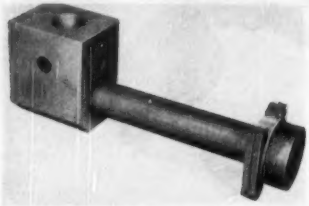
Chemico Plants are Profitable Investments

the condensing water required by the shell and tube condenser method and since it replaces both conventional condenser and cooling tower its first cost as well as operating cost is low.

Circulating Steam Jets

New steam jet made of graphite.

The Series FM-1A "Karbate" Brand impervious graphite circulating steam jet is announced by National Carbon Div., Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.



The jet itself is made entirely of "Karbate" impervious graphite, while the riser is a standard "Karbate" impervious graphite pipe fitted with a Neoprene "Flexlock" gasket at the submerged connection to the jet and a Type V flange connection at the other end, permitting simple connection to steam lines. They are available in two sizes. Size 2 and Size 4, with riser assemblies up to 9'—3¼" in height, and supplement the two types of "Karbate" impervious graphite heat exchangers used for indirect tank heating.

These circulating steam jets are particularly adapted to the heating of liquids in tanks where agitation, good circulation and low cost are requisites and where dilution of the solution is not harmful as they withstand the action of practically all corrosive liquids.

Magnetic Separator

Permanent magnetic separator removes tramp iron from gravity flow pipes.

A new permanent (non-electric) magnetic separator for removal of tramp iron from material flowing in round gravity flow pipes is available from Eriez Mfg. Co., Erie, Pa. To install the Alnico magnet in a pipeline a small section of the pipe is cut out where the magnetic protection is desired. At the inlet side the adaptor fits over the outside diameter of the pipe; at the outlet side it fits inside the pipe. This eliminates all fittings.

Atomizing Nozzle

Pneumatic nozzle provides automatic operation.

Spraying Systems Co., 3256 Randolph St., Bellwood, Ill., announces the ¼ JAU automatic pneumatic atomizing nozzle. This nozzle provides an intermittent spray . . . controlled by a cam or lever operated valve in the air line. The nozzle operates only when the air line is open. By either manual or mechanical operation of the air valve, the operating period of the nozzle can be timed to meet any requirement.

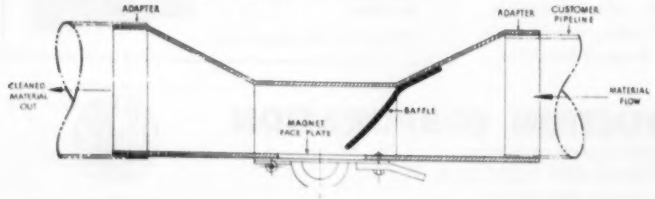
JAU nozzles are small and compact in design with a 1½" diameter size and are available in a variety of materials such as brass, stainless steel, and monel metal. They are supplied in a selection of air and fluid nozzle set-ups to produce a round spray, multiple round spray, or flat spray . . . for siphon type or pressure type operation.

Portable Mixer

Patterson Foundry redesigns Typhoon mixer.

A newly designed 1950 model Typhoon portable power mixer is now available from The Patterson Foundry & Machine Co., East Liverpool, O. The new mixer is built in both plain and direct drive types and geared type models in ¼, ½, and ¾ h.p. sizes, and is available with both open and explosion-proof motors.

New features are special light, sturdy construction, continuous-duty industrial type motor, and very widely-spaced outboard ball bearings. Both direct drive and geared units have full Universal adjustment, making the mixers adjustable to any angle of operation—vertical or sidewise. Adjustment is accomplished with one simple locking device of a new type which requires no tools. All Typhoon mixers are supplied with stainless steel shafts and two stainless steel propellers.



Water Conditioner

New conditioner combines zeolite with hot process softening.

Cochrane Corp., 3154 N. 17th St., Philadelphia, Pa., has available a new type of water softening equipment, combining the virtues of a hot process softener and a zeolite softener. In the Cochrane hot process zeolite water conditioner the zeolite softener is used as a second stage following the first stage in which lime is the single reagent. This first stage precipitates the bicarbonates and magnesium in the water supply leaving the remaining hardness to be removed by the zeolite softener, utilizing salt as a regenerant.

This unique combination has been made possible by new high temperature resins which will withstand both the high temperatures and the pH values obtained in the hot process stage. Former zeolite materials, whether natural or synthetic, were unable to stand beyond 120° F. without disintegration.

• For measuring **liquid-level changes** greater than 5". Fischer & Porter Co., Hatboro, Pa., offers the displacer-buoy Levelimeter. By selecting dimensions and properties of the displacer-buoy components the total liquid-level change, whatever it may be, is caused to produce a total buoy travel of 5 inches, thus matching the standard travel of F&P instrument transmitters.

An electric impedance bridge or a patented F&P Magnabond magnetic transmitter can be used to transmit level readings to an exhibiting instrument. When operation will be at atmospheric pressure only and a direct connection into the instrument case from the liquid chamber is permissible, a direct mechanical connection may be made from the buoy to the exhibiting instrument mechanism.

• New **splash-proof** type CSP Life-Line **induction motors** available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa., are designed for constant speed applications. They are fully protected from dripping or splashing liquids by solid rolled-steel frames and baffles in the end brackets.

The horsepower ranges from 7½ to 100 at 60, 50, and 25 cycles and will operate on 208, 220, 440, 550, and 2300 volts. The NEMA standard dimensions are Frames 364 through 445.

• A new line of **vibrating feeders and conveyors** has been introduced by the Free-Flow Co., 1530 N. Gordon St., Hollywood, Calif.

The Free-Flow is of the mechanical vibration type, with a patented balanced, pendulum construction. It is self cleaning to the last particle.

Do it the EASY way — *Standardize on* POWELL VALVES

When you get your valves from various sources, buying for replacement—and stocking spare valves and parts—becomes unnecessarily complicated.

But when you buy ALL your valves—Bronze, Iron, or Steel, and, if you need them, Corrosion-Resisting Valves—from ONE source, you have the answer to your flow control problems. Powell makes them all* and makes them better. Also Powell makes the *only* COMPLETE Line of Valves for Corrosion-Resistance available to Industry today.

Fig. 1847—200-pound Stainless Steel Swing Check Valve with screwed-in cap and regrindable, renewable disc.

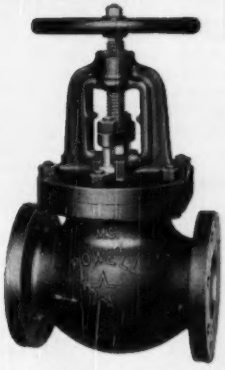


Fig. 241—Large 125-pound Iron Body Bronze Mounted Globe Valve. Sizes 2" to 16", incl. Has outside screw rising stem, bolted flanged yoke and regrindable, renewable bronze seat and disc.

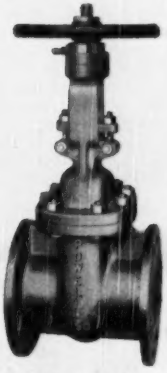
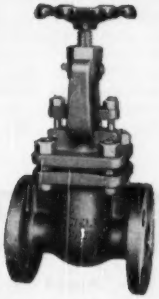


Fig. 2453-G—Standard 150-pound Stainless Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and tapered solid wedge.



New 150-pound Gate Valve with flanged ends, outside screw stem and yoke, bolted flanged bonnet. Face to face dimensions conform to MSS SP42. **Fig. 2471** — Available in 18-8S, 18-8S Mo, Durimet "20" **Fig. 2473** — Available in Nickel, Monel Metal, Ampco Alloy, Everdur, Hastelloy Alloys A-B-C. These valves are also available with screwed ends.

New 150-pound Globe Valve with screwed ends, outside screw rising stem and yoke, and bolted flanged bonnet. **Fig. 2474** — Available in 18-8S, 18-8S Mo, Durimet "20". **Fig. 2476** — Available in Nickel, Monel Metal, Ampco Alloy, Everdur, Hastelloy Alloys A-B-C. Flanged end valves are furnished with face to face dimensions conforming to latest MSS Standards.

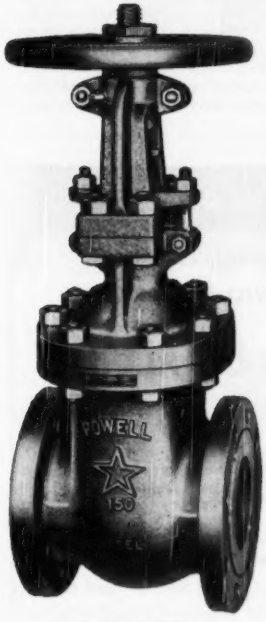


Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

Fig. 375 — 200-pound Bronze Gate Valve. Screwed ends, union bonnet, inside screw rising stem and renewable "Powellium" wear-resisting nickel-bronze disc.

***The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.**

Ask your nearest Distributor—or write direct

The Wm. Powell Co., Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

Accurate control of feed may be maintained. Power consumption is low; and the unit is very quiet in operation.

The Free-Flow can be made in any length using a single drive. Hot or cold materials of any size or shape can be conveyed horizontally, around corners, and up inclines. Troughs can be furnished in any suitable material and may be open or enclosed. The Free-Flow is manufactured in sizes and capacities to suit the user's requirements.

• A new all-steel 21" single-disc **aspirator** made by Sprout, Waldron & Co., Inc., Muncy, Pa., separates light from heavy solids. Gravity-fed product drops through an adjustable feed sleeve onto a 21" saucer-like cast iron disc which revolves at an adjustable speed of 98 to 160 rpm. Separation is performed by an air stream.

• A miniature **radiation pyrometer** for measuring temperatures of targets as small as ½" dia. at short distances has been developed by the Brown Industrial division of Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pa. The new device is for use where space is limited and temperature ranges from 200 to 2500 deg. F.

• A new flow-type **conductivity cell** for ultra pure demineralized water is available from Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J. It is of heavy pyrex glass construction with sheet platinum electrodes. The cell constant is 1/100 and is adapted for Solu-Bridge and Recorder ranges as low as 0-1 micromho.

• Eriez Manufacturing Company, Erie, Pa., has redesigned its line of permanent **magnetic pulleys** to provide increased magnetic power, lighter weight and greater structural strength. In some models the magnetic pull has been increased as much as 50%.

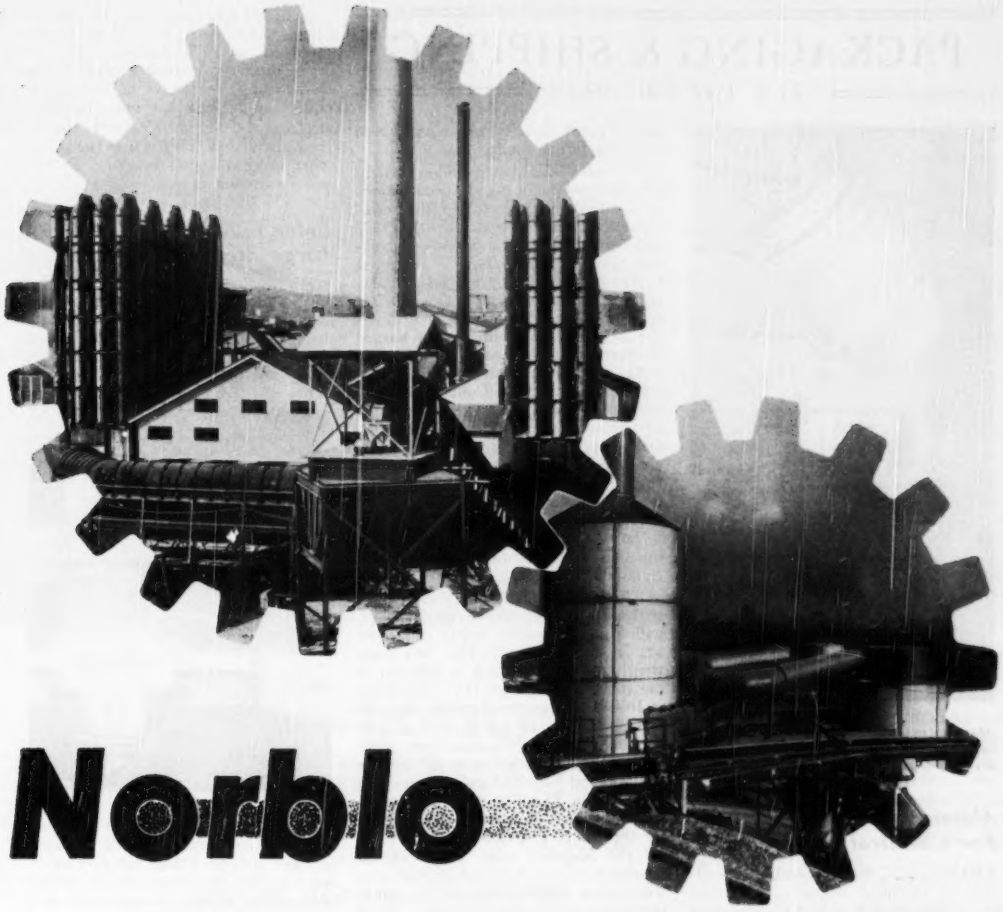
• The new IMO Series A313A **pump** of De Laval Steam Turbine Co., Trenton 2, N. J., is designed for pumping petroleum products and other light or viscous fluids in volumes to 85 gpm against pressures up to 150 psi. There are only three working parts—a power rotor and a pair of sealing or idler rotors which mesh with the power rotor in such a manner that liquid is conveyed continuously from inlet to outlet. This De Laval-IMO can be direct-connected to electric motors, turbines or other high speed drivers without reduction gearing.

• Feon Dynel **filter cloth** seals easily and resists rim cutting when used on filter presses and similar filters. According to Filtration Fabrics Division, Filtration Engineers, Inc., 155 Oraton St., Newark 4, N. J., this texture makes the new filter cloths easy to seal without requiring excessive rim pressures.

Dynel fabrics are especially recommended where hot acids are involved. They also possess superior resistance to alkalies, bacterial action, and a variety of organic solvents.

• A new series of Type "X" explosion-proof **propeller fans** for Class I, Group D hazardous locations, combining the performance features of the IIg Type "Q" propeller fan and the ball bearing explosion-proof motor, has been introduced by the ILG Electric Ventilating Co., 2850 Crawford Ave., Chicago 41, Ill.

• The Wilcolator Co., Elizabeth, N. J., is offering its Type R **electric thermostat** with modifications. The modified Type R thermostats can be used for virtually any application, whereas Series R thermostats may be utilized only for automatically controlling temperatures of an electrically-heated medium. In addition they may be used as on-off switches.



Norblo

Heavy Duty

DUST AND FUME COLLECTION

With three types of dust collectors — automatic bag, centrifugal and hydraulic — Norblo installations are geared to the heavy duty requirements of the smelting, mining, cement and rock products, foundry, chemical and milling industries.

Norblo Automatic Bag Type dust and fume collectors are outstanding in performance in continuous operation. These units are adjustable for varying dust load without shutting down. The periodic short cycle cleaning, automatically controlled, insures sustained collection efficiency at maximum. May we send you a handy Norblo Airflow Calculator — no obligation.

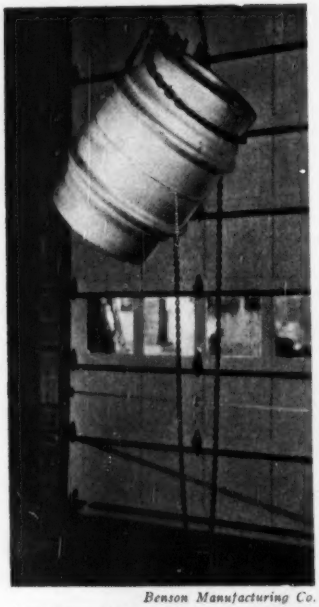
The Northern Blower Company

6418 BARBERTON AVENUE • CLEVELAND 2, OHIO

Automatic and Standard Bag Type Fume and Dust Collectors • Norblo Centrifugal and Hydraulic Collectors • Cement Air Cooling Systems • Exhaust Fans

PACKAGING & SHIPPING

by T. PAT CALLAHAN



Benson Manufacturing Co.

Aluminum drum filled to maximum capacity of 56.1 gallons before first drop of 6 feet to concrete in drop test.

Aluminum, Rubber Drums For Chemical Shipments

AMONG ICC metal containers available to chemical shippers, aluminum and rubber drums occupy an important place, and this current series on drums continues with an examination of their specifications. ICC specifications for aluminum drums consist of ICC 42B, ICC 42C, ICC 42D, ICC 42E, and the specification for rubber drums is specification ICC 43A.

Specification ICC 42B, which is the master specification for aluminum drums, permits construction of aluminum drums up to 110 gallon size, with a minimum thickness of material of 0.110 for sizes not over 10 gallons to 0.230 for the 110 gallon size. The material specification for ICC 42B, ICC 42C and ICC 42D drums is body and heads of aluminum at least 99 per cent pure, or an aluminum base alloy of equivalent corrosion resistance and physical properties. The material for the ICC 42E is body and heads of aluminum alloy 52S. In addition, plastic closure plugs if suitably resistant to action of lading are permitted in the ICC 42E specification.

All except the ICC 42E, which is a single trip container, are commonly referred to as returnable type drums. The outage allowed in the construction of all ICC aluminum drums is 2 per cent of rated capacity, plus a maximum tolerance of one quart.

ICC 42C, 42D drums follow generally the construction and specifications of the ICC 42B except for the minimum thickness of material, the ICC 42C being slightly heavier in construction than the ICC 42D. For the more hazardous materials shipped in aluminum drums, obviously, the master specification or the ICC 42D drum is required and, depending upon hazard of other materials permissible for shipment in aluminum drums, one must consult the Interstate Commerce Commission Regulations to determine which particular specification of aluminum drum is permissible for the given product. Aluminum drums are used for the shipment of nitric acid of 80 per cent or greater concentration which does not contain significant quantities of sulfuric acid or hydrochloric acid as impurities, and various flammable materials.

ICC 43A rubber drums may be constructed in three sizes: 5-gallon, 13-gallon and 30-gallon. Other capacities are not authorized. The minimum weight of rubber which is allowed in the construction of an ICC 43A drum is 18 pounds for the 5-gallon size, 30 pounds for the 13-gallon size, and 85 pounds for the 30-gallon size, with with minimum thickness of $\frac{3}{8}$" for the body on the 5 and 13-gallon sizes and $\frac{9}{16}$" for the 30-gallon size. The minimum thickness for the heads is $\frac{1}{2}$" for the 5 and 13-gallon size and $\frac{11}{16}$" for the 30-gallon size. The material specification is as follows: At least two laminations in body and heads; inside lamination of synthetic rubber, or of pale crepe rubber compounded with paraffin or otherwise treated, such as to be capable of withstanding the action of hydrofluoric acid, up to 65 percent H. F. maximum, for 30 days without any substantial deterioration; other laminations of cotton fiber and rubber.

This rubber drum is used quite extensively for the shipment of hydrochloric acid and is also used by shippers of hydrofluoric acid up to 65 percent. In many cases it has replaced the glass carboy for shipments of hydrochloric acid.

Dow Dedicates Terminal At Charleston, S. C.

The Dow Chemical Co. recently dedicated its new terminal and storage facilities constructed at the North Charleston terminals of the South Carolina state ports authority. Regular water shipments of caustic soda and other chemicals from Dow's Texas plant will be received, promising better chemical distribution for the industrial southeast.

A 12,750-ton Dow boat, the Marine Chemist, has been outfitted to handle shipments of liquid caustic soda and other products including glycols and carbon tetrachloride, from Texas. Facilities at the new terminal include a steel storage tank of 4,000 ton capacity for caustic soda. Dry caustic soda and other chemicals will be stored in terminal warehouses.

Color Lithography for Large Steel Containers

Multi-color lithography for exteriors of 55-gallon steel durms, opening new avenues in packaging and merchandising of oils, chemicals, foods and other products, was introduced recently by the Rheem Manufacturing

Co. Known as Rheemcote, it was perfected in collaboration with a manufacturer of large lithograph presses. A specially designed press which handles large sheets of heavy-gauge steel as a conventional press handles paper was a major factor in the development.

In addition to the special multi-color lithograph presses, Rheem has developed and adapted special machinery which forms and welds the flat lithographed sheets into drums without marring or burning the glistening surface.

The first press installed prints individually any number of colors on 50" x 72" sheets of 18-gauge steel which are formed into 55-gallon drums. This application of multi-color lithography makes it possible to provide economically the same distinctive illustrations and clear, cleanly printed text on a 55-gallon drum as are now placed on small cans. It is expected to encourage use of printed or decorated 55-gallon steel drums.

Maker Warns on Adhesives Use, Offers Chart

A large percentage of adhesive failures may be traced to unauthorized additions, dilutions and other tampering with formulas, according to Paisley Products, Inc., industrial and packag-

FOR BETTER PROTECTION ON HARD-TO-PACK PRODUCTS

use St. Regis Plyolene Multiwall Paper Bags

Markets for many food and chemical products these days are being won or lost by the margin of a few cents per hundred-weight in production cost. Lower costs spell larger sales.

- The decisive cost difference may be gained for your own hard-to-ship products by packing them in St. Regis Plyolene Multiwalls. Their Polyethylene ply-coating protects the contents.
- St. Regis Plyolene Multiwalls are actually saving many manufacturers up to 46 cents per cwt. by their combined economy in price—lower storage, freight, packing and handling costs—and lower container tare-weight.
- These specialized St. Regis Multiwall Paper Bags were developed for products requiring high resistance to oil, grease, moisture, alcohol, alkalies and most acids. The coated ply is an inner layer—inert, odorless, non-toxic. It gives even greater strength to the tough St. Regis kraft Multiwall.
- *Your nearest St. Regis Sales Office can give you specific answers on the suitability of Plyolene Multiwalls and their saving in costs.*

SALES SUBSIDIARY OF ST. REGIS PAPER COMPANY

ST. REGIS

SALES CORPORATION

230 PARK AVENUE • NEW YORK 17, N. Y.

Allentown, Pa. • Atlanta
Baltimore • Birmingham
Boston • Chicago
Cleveland • Denver
Detroit • Houston
Kansas City, Mo. • Los Angeles
Louisville • Minneapolis
New York • Norfolk • Ocala, Fla.
Portland, Ore. • St. Louis
San Francisco • Seattle

In Canada:
St. Regis Paper Co. (Can.) Ltd.
Montreal • Hamilton • Vancouver

YOU BUY PROTECTION WHEN YOU BUY MULTIWALLS

ing adhesive manufacturer. Today's adhesives are specialized formulas for specialized applications and should be handled with considered judgment if full value is to be enjoyed. This is especially true with synthetic resin emulsion adhesives as many are not compatible with additives or diluents commonly used for adjusting old-time adhesives.

Changing of the formula-balance in an attempt to make adhesives go farther, dry slower or faster, can often lead to eventual adhesive failure, such as blistering, delamination, discoloration, etc., after merchandise leaves the factory, if not immediately after application. Many adhesives today are usually supplied in a ready-for-use consistency, and any dilution should be done according to the manufacturer's directions. Most of them can take a certain percentage of added water, but reductions should be made in small amounts, 1 or 2 per cent at a time, with constant stirring and testing to avoid over-dilution.

To assist adhesive users in figuring the proper amount of water to be added to a given amount of adhesives for any desired percentage dilution, the Paisley Laboratory has prepared a chart which eliminates calculations. Copies of the chart will be sent to adhesive users addressing requests to Paisley Products, Inc., 1770 Canalport Ave., Chicago, Ill. or 630 West 51st St., New York 19, N. Y. or other sales offices.

New Compression Packer For Fertilizers, Soap

Up to 180 consumer units per minute can be compression packed into shipping containers by one operator using the recently developed Automatic Compression Packer of Union Bag & Paper Corp., 233 Broadway, New York, N. Y. Cycling at a top speed of 15 shipping containers a minute, the production of two or three packing machines can be fed into this machine direct from the packing lines.

The machine is versatile as 1 to 25 lb. packages can be handled with only a slight mechanical adjustment. Moreover, interchangeable duckbills make it possible to package rectilinear cartons or round cornered bags.

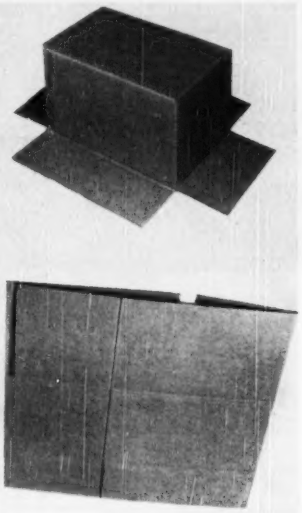
Aside from the savings in labor, these other advantages are claimed for the compression packer:

1. Shipping container size can be reduced. This means substantial savings in container cost.
2. Combined structural and columnar strength of compressed units provide resistance to crushing.
3. Being rectilinear in shape, the shipping containers lend themselves to shipping and palletizing without damage to the consumer packages.

Union officials see a large potential market for their new machine. In addition to food products, fertilizer and soap powder are among products adaptable to the Automatic Compression Packer.

Corrugated Carton Has No Bottom Seam

Shelton Manufacturing Co., Inc. has perfected a self-locking corrugated carton with no seam at the bottom. Called Shellock, it is said to be based



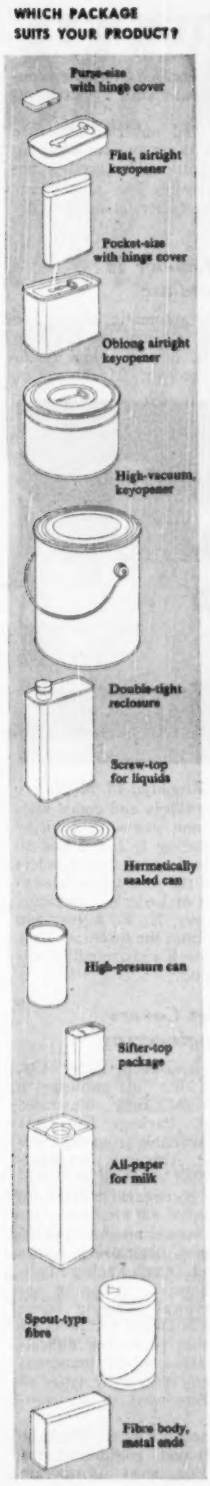
on a new construction principle. A knocked-down carton can be easily folded into a rigid box with double thickness of corrugation at the bottom and sides. Of particular interest is the fact that the new Shelton carton does not occupy any more storage space than the conventional carton, but does have exceptional strength at the bottom due to the lack of a seam.

Machinery Mfrs. Meet Sept. 23-26

Packaging Machinery Manufacturers Institute will hold its eighteenth annual meeting at the Homestead, Hot Springs, Va., September 23-26, 1950. Edwin H. Schmitz, general sales manager, Standard-Knapp, Portland, Conn., is chairman of the program committee.

Mercury Packaged in Polyethylene

Merck & Co., Inc., Rahway, N. J., is using an 8-ounce Boston Round Plaxpak polyethylene bottle made by Plax Corp., Hartford, Conn., as a container for "Mercury Merck." Five pounds of the reagent are put in the



LOOK . . . one hand!

You know it best as a pocket, purse or bed-table container for tablets—the tiny tin that flips open and snaps shut at the press of thumb and finger!

What you may not know is that this same "magic corner" closure, so popular with millions of Americans, is available in an exciting variety of larger size metal boxes, each offering your product a new consumer appeal!

The "flat-fifty" cigarette box, for instance. Consider it as a possibility for crayons; for tissues; water color paints; lolly-pops—even panatela cigars. Flat as your wallet, it fits snugly into purse, pocket, brief case or the glove compartment of your car.

Many sizes . . . a legion of uses

Other Canco metal boxes with the "magic corner" closure are deeper, wider, longer, smaller. In fact, almost any rectangular shape or size can be custom-made if we do not have the exact size you require.

Each box opens to display entire contents; closes tight to prevent spilling. Each can be lithographed for big display of your brand name and message. All can be filled automatically and fast.

Pioneer package problem-solver

In the creation of new and more effective packages, Canco has been out front since 1901. Better *Call Canco First!*

AMERICAN CANCO CAN CO.
NEW YORK CHICAGO SAN FRANCISCO HAMILTON, CANADA

bottle which is encased in a outer container of cardboard with a metal bottom.

Eye appeal and unbreakability are cited by Merck as reasons for adopting the Plaxpak bottle. The bottle's unbreakability prevents loss of contents in case the container is accidentally dropped.

New Vial Labeler Is Light, Automatic

A completely automatic labeler and coder for vials or ampules, weighing only 45 pounds, is now being manufactured by Potdevin Machine Co.,

1285 38th St., Brooklyn 18, N. Y.

This machine labels and codes vials or ampules of one size with a model available for labeling 1, 2, 3, 5 and 10 c.c. sizes. A battery of five labelers was installed in the production laboratory department of Lederle Laboratories in Pearl River, N. Y., a year ago and reports are that the machines have performed very well and are still working at top efficiency.

New Booklet Covers Package Engineering

The Hinde & Dauch Paper Co., Sandusky, Ohio, has just published a comprehensive and fully illustrated booklet entitled "Package Engineering", which is available from the company on request. Although user-slanted, it is a detailed study of the technical aspects of corrugated box design and construction.

The 24-page book contains some 46 large photographs illustrating scenes from the Hinde & Dauch Package Laboratory, miscellaneous packaging operations and typical shipping boxes made by Hinde & Dauch for products presenting peculiar packaging difficulties. The book also contains numerous drawings showing the many types of corrugated inserts used in an engineered package.

In general, according to "Package Engineering", boxes engineered for product protection must incorporate

SIFT PROOF MOISTURE PROOF TOUGH AS A PIG'S NOSE!

Fulton W. P. P. L. bags cost less than rigid containers, save on storage space, reduce cost of handling and shipping. Made from durable, tough burlap or cotton material laminated with waterproof adhesive to a special, crinkled Kraft paper lining. Positively sift proof and moisture proof, and much stronger than unlined textile bags. Fulton's W.P.P.L. bags (waterproof paper lined) are ideal containers for export and domestic shipments of hygroscopic materials, lawn and garden mixtures and other special fertilizers.

Investigate the advantages of these modern containers for your product. Write the Fulton branch nearest you.

NATIONALLY RECOGNIZED QUALITY

The high quality of Fulton Multiwall paper bags has won broad recognition from the largest users in many industries, who have favored us with orders. Our new modern plant in New Orleans is producing all types of Multiwalls. Give us a call on your next order.

Fulton BAG & COTTON MILLS

Atlanta • New Orleans • Dallas • St. Louis • Kansas City, Kans. Minneapolis • Denver • Los Angeles • New York, 434 Broadway

certain basic principles—of "retention, exclusion, resistance, cushioning, bracing, clearance, shielding and marking"—if it is to meet the requirements of a product. Application of these principles is illustrated. Similarly, according to "Package Engineering" the modern, engineered box is a vast improvement over conventional boxes if it follows the basic principles of design, listed as "the principles of attention, identification, information and display." A collection of 24 photographs of boxes designed for product presentation and demonstrating these principles of design illustrates this section of the book.

A "packaging questionnaire" by which any user of corrugated boxes may analyze his packaging program makes up the final section of the book.

New Truck for Handling Drums

The Liftomatic truck for handling drums, fibre or steel, or any container with a bead, rim, or chime, regardless

of size, has been introduced by the Marvel Industries, Skokie, Ill.

The jaws close and open automatically on the rim without any damage to drum or bead, which makes this an ideal truck for handling fibre drums.

This truck is built of steel and will take loads up to 1,000 pounds. It is light in weight, weighing only 40 pounds, with full roller bearing wheels, mounted with 10 x 2.50 solid rubber tires, or 8 x 2.50 cushion tires.

Manual on How to Unload Liquid Caustic

The Manufacturing Chemists' Association has published a revised Manual Sheet TC-3 which incorporates recommended practices for unloading liquid caustic from tank cars (caustic soda and caustic potash).

This manual has been completely rewritten and contains the best known recommended procedures and safety precautions.

Copies may be obtained at 20 cents each from the Manufacturing Chemists' Association, Inc., 246 Woodward Building, Washington 5, D. C.

A Symphony in "F" Style Cans

Continental "F" Style cans can help you strike a high note in packaging chemical products from floor wax to radiator flush.

If your specifications call for lithography, Continental's specialists can make your brand stand out against competition. And, of course, your product is well protected when it's shipped in a Continental "F" Style can.

These rugged, attractive cans are available in practically every size you could want: ½-pint, pint, quart, ½-gallon and gallon. Why not check with Continental today and get the complete story on our "F" Style cans?

Continental also makes steel containers that are tops for bulk shipments of chemical products. They include:

CONTAINER	SUGGESTED USE
Open Head Pails	Adhesives
Closed Head Drums	Anti-Freeze
Utility Can	Insecticides
50 & 65 lb. Flaring Pails	Soap Powder
Small Flaring Pails	Dry Chemicals

CONTINENTAL CAN COMPANY

Eastern Division: 122 E. 42nd St., New York 17 Central Division: 135 So. La Salle St., Chicago 3 Pacific Division: Russ Building, San Francisco 4

LABORATORY EQUIPMENT

Sampling Dipper

New dipper has valve at base to automatically open to empty contents into sample bottle.

A new sampling dipper has been developed by the Harold S. Spencer Co., Homer, N. Y. The new dipper enables the user to transfer liquids to a sample bottle in a matter of seconds. Made of highly-polished stainless steel, the new dipper has only three parts so that it can be easily taken apart and cleaned.

The handle consists of a sturdy rod, at the base of which is a finely-ground valve. A movable cup, held in place with a special spring clip, rests on the valve. The clip, which snaps over the top of the cup, regulates the opening between the base of the cup and the valve on the rod.

When the filled dipper contacts the top of a sample bottle, the valve automatically opens, and its contents empty into the bottle. Because the surfaces of both the cup and valve are precision ground, any possibility of liquids dripping is eliminated.

Spencer's new sampling dipper is being made available in a standard model with 12 cc capacity, in 18", 24", 30" and 36" lengths. Dippers with larger or smaller capacities and in special lengths will be manufactured to order.

Boron Lined Neutron Counter Tube

New tube measures slow neutron intensities.

A new proportional counter tube, sensitive to thermal neutrons, is available from the Special Products Div. of the General Electric Co., Schenectady 5, N. Y. The boron lined neutron counter tube will enable measurements of slow neutron intensities for nuclear scientific purposes.

The cathode cylinder is made from seamless steel tubing. The internal surfaces of the cylinder are coated with metallic boron enriched in the isotope Boron 10 which has a large effective area for slow neutron capture. The cylinder is filled with a gas mixture to obtain self quenching action. The boron coating represents a thin foil which is immersed in a stream of slow neutrons. The nucleus of the boron 10 isotope on capturing a slow neutron, disintegrates into an alpha particle and a lithium nucleus, with a release of a known amount of energy. This energy is shared by the two particles which fly apart in opposite directions. Because these particles are positively charged, they ionize the gas that is sealed in the tube. The liberated electrons are collected by a thin anode of stainless steel wire that is located longitudinally in the center of the tube, causing a momentary ionization current. This in turn is amplified and recorded. Tubes of 8" and 12" sensitive length are available.

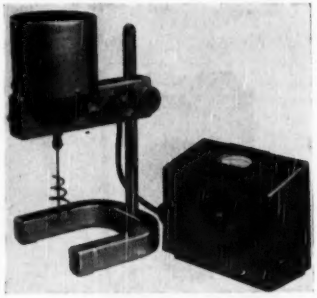
Oscilloscope

The new Analascope of Analytical Measurements, Inc., 585 Main St., Chatham, N. J., measures and continuously shows any phenomena that can be translated into electrical impulses.

One moment the **oscilloscope** can serve as a pH meter which measures to .001 pH, and the next moment it can serve as a pressure indicator, or a strain analyzer.

Results are displayed on the long persistence screen of a 5" cathode-ray tube. It allows continuous observation of non-recurrent phenomena at sweep speeds of from .01 to 5 seconds. A two decade precision potentiometer calibrated with a self-contained standard cell provides direct measurements from .001 pH to 15 pH and 0.1 millivolts to 1.5 volts. An input attenuator of 1,000 megohms provides overlapping ranges of 1 micro-microampere to 10 milliamperes and 1 millivolt to 100 volts per centimeter deflection.

• Especially designed for the measurement of thixotropic, gel or polymerizing substances, the **potentiometric viscosimeter** has been



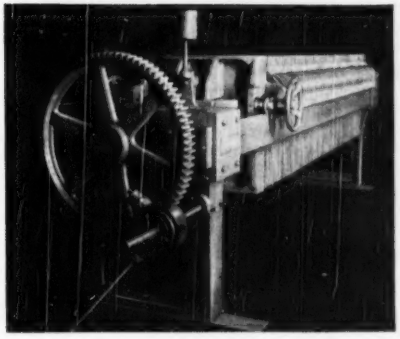
introduced by the Emil Greiner Co., 20-26 N. Moore St., New York, N. Y. Complicated mechanical clutches and linkages are eliminated and the unit can be used in conjunction with any potentiometric recording devices.

When used for gel-time studies, the new viscosimeter provides automatic stop at maximum deflection. There is an additional outlet for intermittent timer when used in studies of thixotropic or congealing substances.

Dollar for dollar... the most efficient process of filtration

SPERRY FILTER PRESSES

The plate filter press, as built by Sperry, is today's most widely used filtration equipment. Why? Because the process industries have learned through experience that this type of equipment offers the greatest dollar value.



Consider what the Sperry filter press will do. It handles *any* filterable mixture, including viscous, and produces maximum clarity with the driest cake. The cake, thoroughly washed, is delivered in slab form ready for the drier trays. These presses will perform low, medium or high pressure filtration under precise temperature control, and will handle hot liquids without vaporizing. The liquid need not be exposed to the atmosphere.

Now, consider the cost. Simple construction means minimum first cost and minimum cost of installation. The simplest filter cloth and paper may be used, just as it is cut from the roll. Operating expenses are minor since unskilled labor may be employed. And maintenance is negligible. There is little depreciation, and because of the wide use of Sperry filter presses, they are easily resold if your processing plans no longer require filtration.

Sperry filter presses are available in a wide range of styles and capacities, equipped with a variety of different closing devices to suit your operation perfectly. Whether your product calls for the filtrate or the cake, or both, Sperry plate filter presses are your guarantee of top efficiency per dollar invested in equipment and labor. Call on Sperry today!

D. R. SPERRY & COMPANY
BATAVIA, ILLINOIS
Filtration Engineers for Over 50 Years

Eastern Sales Representative:
H. E. Jacoby, M.E.,
205 E. 42nd St.
New York 17, N. Y.
Phone: Murray Hill 4-7581

SPERRY
FILTER PRESSES

Western Sales Representative:
B. M. Pilhashy,
833 Merchants Exchange Bldg.
San Francisco 4, Calif.,
Phone: DO 2-0375

INDUSTRY'S BOOKSHELF

Heterocyclic Compounds, Vol. I, *edited by R. C. Elderfield.* John Wiley & Sons, Inc., New York; vii + 703 pp., $11.

THIS is the first of a series of volumes on heterocyclic compounds. The first volume is concerned with monocyclic compounds containing one hetero atom.

The treatise concentrates on the principles of chemistry, rather than on a detailed enumeration of reactions. When a field has already been adequately covered in another book, it is not given exhaustive treatment in this treatise.

Textbook of Biochemistry, *by Benjamin Harrow.* W. B. Saunders Co., Philadelphia; vii + 609 pages, $6. **Laboratory Manual of Biochemistry,** *by Harrow et al.* W. B. Saunders Co., Philadelphia; vii + 149 pages, $2.25.

THE FIFTH edition of Harrow's text has been extensively revised and rewritten. A new chapter on biological antagonists has been added and frequent references to microbiological methods have been incorporated.

The third edition of the "Laboratory Manual", designed to accompany the text, is also suitable for use with other texts. The third edition stresses the increasing importance of photocolorimetric methods, electrometric titrations, and tissue respiratory measurements.

The Organization of Industrial Scientific Research, *by C. E. K. Mees and J. A. Leermakers.* McGraw-Hill, New York; viii + 383 pp., $5.

THE SECOND edition of this work follows the first by thirty years, so it is essentially a new book. It presents an account of the history and development of industrial scientific research, the general principles of its conduct, and an analysis of the methods actually used for the organization and operation of industrial research laboratories.

The Essential Oils (Vol. 3. Individual Essential Oils of the Plant Families *Rutaceae* and *Labiatae*), *by Ernest Guenther.* D. Van Nostrand Co., Inc., New York; 777 pp., $10.00.

THIS THIRD volume of "The Essential Oils" series by the technical director of Fritzsche Brothers, Inc., consists, as will succeeding volumes, of monographs on individual oils, describing their botanical and geographical origin, methods of cultivation of the plants from which they are derived, techniques of distillation and yield of oil, their physicochemical properties, chemical composition, total production, and uses in the industry.

Individual oils are grouped within the families to which the respectve aromatic plants belong, but in the sequence of the plant families, no botanical system is followed. This gives first place to those families the essential oils of which are technically and commercially most important. Thus in the third volume, special emphasis is placed on the very important citrus oils in describing the plant family *Rutaceae.* At the end of the last volume, however, a key or table showing classification of essential oils according to a modern botanical system will be provided.

Titanium, *by Jelks Barksdale,* The Ronald Press Co., New York, N. Y.; 591 pp., $10.

THIS BOOK provides a reference volume on all phases of titanium chemistry and should serve as an excellent starting point for any studies that are being made on this increasingly important material. It is more of a literature study than a critical review, which can be seen from the fact that some 67 pp. are devoted to references alone.

The author has divided the subject into discovery of titanium, together with a rather detailed study of the mineral deposits which yield titanium, and a study of the production and imports of these ores. He next surveys the chemistry of titanium and its oxides, salts, and organic compounds, following this with a brief survey of the methods of chemical analysis used on titanium compounds. After this, he has gone into the various aspects of production of titanium pigments, which processes are the reasons for the existence of the huge industry that exists today. The book closes with references to the use of titanium metal as an alloying material and special uses for the oxides and other compounds.

Acetylene and Carbon Monoxide Chemistry, *by John W. Copenhaver and Maurice H. Bigelow,* Reinhold Publishing Corp., New York, N. Y.; 357 pp., $10.

ACETYLENE CHEMISTRY has become the fair-haired boy of chemical literature since the wonders of "Reppe-Chemie" were first opened to public view at the war's end. With the possible exception of the writings of Dr. Reppe, put together while he was in Camp Dustbin, this represents the first summary of this fascinating subject. Certainly, it is the first study that makes any attempt at all to give a critical analysis of the reactions involved.

All available information up to 1949 is presented to show the development of the chemistry of acetylene under pressure of vinylation, ethynylation, polymerization and carboxylation. Procedure for safe handling of acetylene under pressure are also a part of the discussion.

The more recent developments in the chemistry of carbon monoxide complete this book.

As this book will undoubtedly be used primarily for reference it is unfortunate that more space has not been given to a more complete index than can be provided in the three pages allotted to it.

An Index of Nomograms, *by Douglas P. Adams,* Technology Press of Massachusetts Institute of Technology and John Wiley and Sons, Inc., New York, N. Y.; 174 pp., $4.

NOMOGRAPHS are useful tools, but like all tools they must be available if they are to be used. Dr. Adams' index should aid a great deal in increasing the availability and utility of these tools.

Nomographs have been indexed by key words and also tabulated under twenty-one divisions such as physics, chemical engineering and chemistry, mathematics, etc. This final tabulation also notes the variables involved and page number of journals carrying the nomographs.

Without such an index the work of searching the literature to ascertain whether a certain nomograph exists was almost as time-consuming as the work needed to construct one.

Physics and Chemistry of Cellulose Fibres, *by P. H. Hermans.* Elsevier Publishing Co., Inc., New York, N. Y.; xxii + 534 pp., $7.50.

THE AUTHOR, director of the Institute for Cellulose Research of the A. K. U. and affiliated companies in Utrecht, is a leading chemist in the

rayon industry. In this book he has succeeded in fusing the empirical knowledge of rayon men with modern developments of the physics and physical chemistry of high polymers and of cellulose in particular. The many references to modern literature on this subject and the extensive subject index constitute a valuable feature.

Organic Coatings in Theory and Practice, *by A. V. Blom.* Elsevier Publishing Co., Inc., New York, N. Y.; xii + 298 pp., $4.75.

DURING THE PAST two decades, the organic coating industry has undergone sweeping changes as to raw materials, methods of manufacture, and finished products. The close connection with the plastics industry has become evident. The author depicts the situation resulting from these developments and to indicate future trends of research and technology.

Organic Reactions, Volume V, *Editor-in-Chief, Roger Adams.* John Wiley & Sons, Inc., New York, N. Y.; viii + 446 pp., $6.

THIS IS the fifth volume of a series which was started in 1942. The intention is to provide a compilation of all the important synthetic chemical reactions. Included in this volume are the synthesis of acetylenes; cyanoethylation; the Diels-Alder reaction with quinones and other cyclenones; preparation of aromatic fluorine compounds from diazonium fluoborates (the Schiemann reaction); the Friedel and Crafts reaction with aliphatic dibasic acid anhydrides; the Gattermann-Koch reaction; the Leuckart reaction; selenium dioxide oxidation; the Hoesch synthesis; and the Darzens glycidic ester condensation.

Advanced Organic Chemistry, *by G. W. Wheland.* John Wiley & Sons, Inc., New York; xi + 799 pp., $8.

THIS BOOK is designed for a second course in organic chemistry for students who have had a good course in elementary organic and elementary physical chemistry. Systematizing the facts of organic chemistry and correlating them with each other and with fundamental theory, the primary and unifying principle of the book is the structural theory.

New Products & Processes

(Continued from page 96)

of the best chemicals for this purpose. The plating baths are kept at 75° C or above because at room temperature the cathode current efficiency is very low and the deposits

are weak. Current densities should be between 5 and 40 amperes per square decimeter. At the usual current density—about 10 amperes per square decimeter—the rate of deposition is fairly high, amounting to a few thousandths of an inch an hour.

The appearance of the deposits depends upon their phosphorus content. Alloys with less than 2 per cent of phosphorus are usually smooth with a mat finish; but as the percentage of phosphorus increases, they become brighter, reaching a peak of brightness at a phosphorus content of about 10 per cent. When such deposits are plated on a dull surface, they increase in brightness as they become thicker. As a result of the slightly dark cast of the high-phosphorus alloys, their reflectivity is 45 to 50 per cent, as compared with about 60 per cent for buffed nickel coatings.

Alloys with higher percentages of phosphorus are highly resistant to corrosion and chemical attack, exceeding in this respect the pure metals. Thus, in experiments at the Bureau the nickel alloy with 10 to 14 per cent of phosphorus was attacked considerably less by hydrochloric acid than was pure nickel.

The pleasing appearance, ease of deposition, hardness, and corrosion resistance of the new alloys suggest the possibility of a number of com-

mercial applications. Their use is indicated for gages, cylinder walls, piston rings, and other machine parts where resistance to wear is an important factor. In this connection, the more rapid rate of deposition as compared with chromium and the better throwing power of the plating bath should be of considerable advantage.

• Two products of interest to the pharmaceutical industry have been introduced by Chemo Puro Manufacturing Corp., 26-32 Skillman Ave., Long Island City 1, N. Y. One is **stabilized choline chloride,** a free-flowing granular product which, due to the incorporation of 0.5% calcium stearate, will not deliquesce in air of normal humidity. A 70% solution of **dicholine tartate** has been introduced for liquid medications. Colorless, odorless, and containing 47½% choline base, it is priced competitively with tricholine citrate.

• A simple test has been devised by the Southern Research Laboratory, 2100 Robert E. Lee Blvd., New Orleans, La., for detecting the presence of **"honeydew" on cotton.** This exudation of aphids causes the cotton to gum up in processing machinery. The test is based on the ability of sugars contained in the exudation to turn alpha-naphthol dark red. Details of the simple test are available from the laboratory.

• The Hanson-Van Winkle-Munning Co., Matawan, N. J. is now offering to the electroplating industry a new **activated carbon** called Pur-O-Carb. This material has been selected as the best available for purifying bright nickel solutions of all types, including the H-VW-M 9H solutions, and also for all other acid and alkaline plating solutions.

• Ohio-Apex, Inc., Nitro, W. Va., is making four **benzyl compounds** available in pilot-plant quantities for research and development: dimethylbenzyl chloride (DMBC), methylbenzyl chloride (MBC), ethylbenzyl chloride (EBC), and methylbenzyl alcohol (MBA). Technical data sheets describing the compounds are available from the company.

• **Cyclo-octatetraene,** a recent product of acetylene chemistry, is now available in experimental quantities from Sapon Laboratories, Inc., 543 Union St., Brooklyn 15, N. Y. A yellow liquid boiling at 142° C, cyclo-octatetraene is stable under nitrogen atmosphere and is redistilled prior to shipment. Possible applications of this material remain largely to be uncovered as relatively little investigation has been done on this organic frontier.

FOUR WINNERS . . . *ready to serve you*

Rigid quality controls, based on years of production experience, make the Polyethylene Glycols true "blue-ribbon" organic chemicals. Polyethylene glycols are water-white liquids which are supplied in four closely controlled molecular weight ranges.

They have these special advantages:

- **100 per cent soluble in water**—mutual solvent for many water-insoluble materials.
- **Low volatility**—much less volatile than either glycerin or the lower glycols.
- **Powerful solvents**—for drugs, dyes, vitamins, resins, proteins, essential oils, and many other difficultly soluble materials.
- **Controlled humectancy**—range of 40 to 80% that of glycerin.
- **Low odor**—no residual odor in finished products.

READY TO SERVE YOU

The polyethylene glycols are used as:
Plasticizers—For paper, cellulose compounds, proteins, resins.
Intermediates—For resins, plasticizers, fatty acid esters.
Lubricants—Where water-solubility of lubricant is desirable.
Humectants—In stamp pad and "steam-set" inks, paper, and other cellulosic products.
Mutual solvents—For dyes, drugs, essential oils.

CARBIDE AND CARBON CHEMICALS DIVISION
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

Did you know—that CARBIDE also produces a series of *solid* polyethylene glycols? These are marketed as CARBOWAX compounds. They have many of the same useful chemical and physical characteristics as the liquid materials—and other singular properties of their own. A booklet with detailed information on CARBOWAX compounds and Polyethylene Glycols is available. When writing address Dept. D-7.

"Carbowax" is a registered trade-mark of U.C.C.

. . . To Help You

LATEST manufacturers' booklets and bulletins on products, processes, and equipment. . . . Fill out and send the postpaid card for your free copies.

Chemicals

Methyl Ethyl Ketone C244*
130-p. book discusses commercial applications of methyl ethyl ketone with particular emphasis on surface coatings. Review of chemical reactions, physical properties and analytical procedures included. Shell Chemical Corp.

Propylamines C245
New Product Bulletin No. 13 describes chemical and physical properties and uses of 3-dimethylaminopropylamine, 3-isopropylaminopropylamine, 3-methoxypropylamine, and 3-isopropoxypropylamine. American Cyanamid Co.

Fatty Acids C246
36-p. booklet describes specifications and gives information on fatty acids. A. Gross and Co.

Molding Powders C247
16-p. bulletin describes the properties and applications of cellulose acetate molding powders. Tables and charts on test data included. Hercules Powder Co.

Rare Organic Chemicals C248
6-p. bulletin lists prices of rare organic chemicals. Paul Kletzke.

Carbon Black Dispersions C249
4-p. bulletin describes technical data and gives operating suggestions for concentrated carbon black dispersions. Acheson Colloids Corp.

Polyvinyl Chloride Coatings C250
5-p. bulletin describes properties and applications of Polyclad, polyvinyl chloride coating. Also describes procedure to test coating effectiveness. Data Sheet C-11. Carboline Co.

Rubber, Natural C251
28-p. booklet contains comprehensive statistics on the natural rubber industry, including charts and tables on natural rubber production, consumption, U. S. imports, etc. Natural Rubber Bureau.

Dextrine and Starch Products C252
1-p. dextrine and starch product operation data sheet, a questionnaire for recording and transmitting product problem information. Morningstar, Nicol, Inc.

Surface Coatings C253
Bulletins on low-bake furniture finishes, baking undercoats, washing machine enamels, heat-resistant enamels, white appliance enamels and metal furniture enamels each contain a suggested formulation, an analysis of the finish, recommended applications and data on film properties. American Cyanamid Co.

Alkyl Acid Phosphates C254
4-p. bulletin describes physical properties, solvent compatibility and suggested uses for alkyl acid phosphates. Technical Bulletin No. P-120, Monsanto Chemical Co.

Alkyl Alkali Phosphates C255
5-p. bulletin describes physical properties, solvent compatibility and suggested uses for alkyl alkali phosphates. Technical Bulletin No. P-121, Monsanto Chemical Co.

Chlorine Enthalpy-Temperature Diagram C256
Graph. 24" by 11" presents the principal thermodynamic properties of chlorine in English system of units. Also reprint of explanatory article giving directions for using. Diamond Alkali Co.

Insecticide C257
6-p. folder summarizes recommendations for applying toxaphene against common cotton insects. Hercules Powder Co.

Plastic Seal Coat C258
4-p. product data sheet describes characteristics, uses and gives directions for application of spray-applied plastic adhesive seal coat and colored mineral granule for weatherproofing masonry. Industrial Products Div., The Flintkote Co.

Adhesives C259
14-p. bulletin reviews development of isocyanate-based adhesives and describes chemical and physical properties of two diisocyanates available. Technical Bulletin No. P-145, Monsanto Chemical Co.

Citraconic Anhydride C260
6-p. folder describes use of citraconic anhydride as a primary standard for alkalies and CHO determination. Smith-New York Co., Inc.

Phosphoric Acid C261
8-p. bulletin describes equipment and procedures for handling 75% phosphoric acid in tank car quantities. Monsanto Chemical Co.

Chemicals C262
4-p. bulletin lists principal products and their specifications and uses of Edwal Laboratories, Inc.

Biological Tests C263*
"Summary Tables of Biological Tests," Vol. 1, Nos. 1 and 2, contains results of tests of compounds submitted to the Chemical-Biological Coordination Center of the National Research Council for preliminary screening to determine their effects on a series of laboratory animals and plants.

Extraction Solvents C264
4-p. bulletin contains specifications for 5 extraction solvents, pentane, isohexane, isoheptane, hexane and heptane. American Mineral Spirits Co.

Flotation and Flotation Agents C265
16-p. booklet includes general discussion of the flotation process and technical material on use of various flotation agents as frothers, collectors, and modifiers. Hercules Powder Co.

Resin C266
4-p. folder describes advantages and use of Resin 138 for wet-strength papers. Hercules Powder Co.

Waxes, Synthetic C267
2-p. reprint, Synthetic Waxes in Textile Applications, describes use of synthetic waxes on textiles and fibres and includes table of their physical properties. Glyco Products Co.

Insecticide C268
8-p. booklet describes application and uses of CPR Dust Base, insecticide dust formed by combination of piperonyl cyclonene, pyrethrins and rotenone. U. S. Industrial Chemicals, Inc.

Sucrose C269
40-p. booklet describes the structure and configuration of sucrose. By Irving Levi and Clifford B. Purves, Scientific Report Series No. 13, Sugar Research Foundation, Inc.

Flavors C270
16-p. catalog lists prices of flavors available from Fritzsche Brothers, Inc.

Fluorganics C271
1-p. data sheet describes physical properties of various fluorganics. Halogen Chemicals, Inc.

Paraplex Resins C272
24-p. booklet describes properties and suggests uses for Paraplex "P" series resins in the laminating, molding, potting and casting fields. Tables and charts included. Resinous Products Div., Rohm & Haas Co.

Equipment

Separator, Magnetic K490
8-p. bulletin describes the application, operation and design of non-electric, Alnico Perma-Drum magnetic separator. Installation diagrams included. Dings Magnetic Separator Co.

Exhibiting and Controlling Instruments . K491
28-p. catalog describes construction and operation of exhibiting and controlling instruments for use with flowrator meters. Catalog 50, Fischer and Porter Co.

Matting K492
4-p. catalog section, No. 6120, contains data and specifications for corrugated, spike resisting, multilin, Koroseal and other kinds of mattings. The B. F. Goodrich Co.

Lead Anodes K493
4-p. bulletin describes advantages and construction of homogeneous lead anodes for chrome plating. Republic Lead Co.

Thermometers K494
44-p. bulletin describes operating principles, characteristics and accessories for Series 500 line of thermometers. Bulletin T840, The Bristol Co.

Fire Extinguisher K495
2-p. bulletin describes advantages of fire extinguisher with removable discharge elbow. Stop-Fire, Inc.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

I would like to receive the following free booklets and catalogs. (7-0)

C244*	C254	C264	K491	K501	K511	K521	K531	K541
C245	C255	C265	K492	K502	K512	K522	K532	K542
C246	C256	C266	K493	K503*	K513	K523	K533	K543
C247	C257	C267	K494	K504	K514	K524	K534	K544
C248	C258	C268	K495	K505	K515	K525	K535	K545
C249	C259	C269	K496*	K506	K516	K526	K536	K546
C250	C260	C270	K497	K507	K517	K527	K537	K547
C251	C261	C271	K498	K508	K518	K528	K538	K548
C252	C262	C272	K499	K509	K519	K529	K539	K549
C253	C263*	K490	K500	K510	K520	K530	K540	K550

* Inquiry must be made on business letterhead.

Name . . . . . (Position) . . . . .

Company . . . . . .

Street . . . . . .

City . . . . . Zone . . . . State . . . . .

Piping and Welding Fittings.....K496*
184-p. catalog contains charts, tables, graphs, condensations and discussion of pipe specifications, welding data, design formulas, metallurgical information and other engineering data. Catalog No. 48, Midwest Piping and Supply Co., Inc.

Welded Fittings.....K497
Booklet entitled "Welded Economizer Returns" by Carl B. McLaughlin discusses case history of modernization program for using welded fittings instead of flanged connections on tubing. Tube Turns, Inc.

Lift Truck, Gasoline Operated.....K498
4-p. bulletin describes operation and dimensions and diagrams gas line operated lift truck. The Yale and Towne Manufacturing Co.

Fluid Energy Grinding Mill.....K499
8-p. bulletin describes advantages, operation and construction of fluid energy construction mill. Diagram included. C. H. Wheeler Manufacturing Co.

Concrete Floor Enamels.....K500
4-p. bulletin describes features and application of enamels for concrete floors and walls. Houghton Laboratories, Inc.

Indicating Amplifier.....K501
8-p. bulletin describes operation and use and gives specifications for stabilized D-C indicating amplifier. Leeds and Northrup Co.

Water Conditioner.....K502
Publication 4801 describes features and operation of hot process zeolite water conditioner. Cochrane Corp.

Laboratory Apparatus.....K503*
902-p. catalog completely describes laboratory equipment and supplies available from the Will Corp. Prices included. Catalog No. 6.

Micro Particle Size Classifier.....K504
2-p. bulletin describes uses and operation of micro particle classifier. Specifications included. Harry W. Dietert Co.

Polyphase Horizontal Motors.....K505
8-p. bulletin describes construction and features of one to 75 horsepower polyphase horizontal electric motors. A. O. Smith Corp.

Metal Hose.....K506
4-p. oulletin describes features and installation and gives specifications for flexible metal hose. Eclipse-Pioneer Div., Bendix Aviation Corp.

Bronze Cooler Pump.....K507
Folder describes features, gives installation instructions and diagrams bronze cooler pump. Jabsco Pump Co.

Gear Motors, Right Angle Type.....K508
4-p. bulletin lists prices and gives dimensions for right angle type gear motors. Bulletin 250, Abart Gear and Machine Co.

Laboratory Instruments.....K509
4-p. bulletin describes line of laboratory instruments available from Bacharach Industrial Instruments Co.

Steel Arc Welding Electrodes.....K510
16-p. catalog contains application data, dimensions, operating procedures, weld metal analyses, and physical properties of seven mild steel arc welding electrodes. Metal and Thermit Corp.

Welding Accessories.....K511
32-p. catalog describes and gives specifications for welding accessories such as helmets, cable, ground clamps, goggles, etc. Metal and Thermit Corp.

Gas Scrubbers.....K512
8-p. bulletin describes advantages, operation and uses of Chemico P-A gas scrubbers. Chemico Bulletin M-102. Chemical Construction Corp.

Weldbrazing.....K513
4-p. bulletin describes advantages of process combining fusion welding and brazing. Uniworld Research Corp. of America.

Fractional Horsepower V-Belts.....K514
6-p. bulletin describes details, interchangeable data and lists prices of fractional horsepower V-belts. Bulletin FHP-101, Maurey Manufacturing Co.

Multiple V-Belts.....K515
4-p. bulletin describes and lists prices for multiple V-belts. Maurey Manufacturing Co.

Steam Cleaners.....K516
9-p. booklet discusses operation and maintenance of steam cleaners. List all possible sources of coil scale build-up and schematic diagram included. The Du Bois Co.

Pipe Fittings.....K517
Catalog 50F, 118 pp., describes and gives weight, dimensions and prices for cast iron and malleable fittings. Engineering data included. Stockham Valves and Fittings.

Sampling Valves.....K518
4-p. bulletin describes advantages and use of corrosion-resistant sampling valves. Diagrams included. Bulletin No. 4, Alloy Steel Products Co.

Liquid Level Gage Valves.....K519
8-p. bulletin describes dimensions, construction and applications and diagrams liquid level gage valves. Jerguson Gage and Valve Co.

Electric Hoist.....K520
8-p bulletin describes features and construction and gives specifications for electric hoist. Bulletin H-112, Whiting Corp.

Flash Mixers and Flocculators.....K521
8-p. bulletin describes design, operation and advantages of Dorrco flash mixers and flocculators. The Dorr Co.

Electrolytic Cleaning.....K522
6-p. bulletin discusses fully the electrolytic cleaning operation, equipment, choice of an electrolytic cleaner and gives general recommendations. The Du Bois Co.

Dishwashing Machines.....K523
4-p. bulletin describes design and dimensions of dishwashing machines. Colt's Manufacturing Co.

Belt-Conveyors.....K524
40-p. catalog describes applications, design, construction, installation and gives specifications for belt conveyors. Diagrams included. Catalog RF, Barber-Greene Co.

Chlorine Treatment of Water.....K525
4-p. bulletin describes processes used for chlorine treatment of municipal water and chlorination equipment. Bulletin A-1A-4, Fischer & Porter Co.

Embrittlement.....K526
4-p. bulletin discusses causes and control of embrittlement and tells how to distinguish between steam boiler cracks caused by corrosion-fatigue and embrittlement. Bulletin 28X7466, Allis-Chalmers Mfg. Co.

Photographic Processes.....K527
16-p. booklet entitled "Functional Photography in Industry" describes processes and techniques useful to business and industry. Industrial Photographic Div., Eastman Kodak Co.

Rotary Pumps.....K528
6-p. bulletin describes design, construction, maintenance, operation and application of rotary pumps. Bulletin 307, Blackmer Pump Co.

Centrifugal Pumps.....K529
4-p. bulletin describes features and gives specifications and dimensions of cradle-mounted centrifugal pumps. Diagrams included. Form 7212, Ingersoll-Rand Co.

Air Hose.....K530
4-p. bulletin describes design, construction and rubber-compounds of Conserve, air hose. Bulletin No. 129, Hewitt Rubber Div., Hewitt-Robins, Inc.

Centrifugal Pump.....K531
4-p. bulletin describes application, construction features, gives dimensions and diagrams encased close-coupled vertical centrifugal pump. Peerless Pump Div., Food Machinery and Chemical Corp.

Laboratory Burners.....K532
6-p. folder describes features and uses of laboratory burners. Fisher Scientific Co.

Mortar Grinder.....K533
6-p. folder describes features and operation of mortar grinder. Fisher Scientific Co.

Basket Centrifuge.....K534
8-p. bulletin describes operation, construction, applications, methods of installation and gives dimensions for horizontal axis perforate basket centrifuge. Bulletin 1257, The Sharples Corp.

Dust Collectors.....K535
4-p. bulletin describes operation and features of dust collectors. Bubar Dust Systems, Inc.

Laboratory Air Conditioning Unit....K536
Bulletin describes design features and installation of self-contained unit for air conditioning laboratories. Carrier Corp.

Conductivity Measurement and Control.....K537
14-p. bulletin discusses principles of Wheatstone Bridge method, design of conductivity cells in relation to service requirements and specific plant applications. Industrial Instruments, Inc.

Automatic Valves.....K538
8-p. bulletin describes construction, design, and capacities of automatic pressure reducing and regulating valves. Bulletin No. 283, A. W. Cash Valve Mfg. Corp.

Gas-Engine-Driven Compressors.....K539
4-p. bulletin describes design and operation of gas-engine-driven compressors. Form No. 3127-A, Ingersoll-Rand.

Centrifugal Pumps.....K540
12-p. bulletin contains engineering data, diagrams, and suggested applications for centrifugal pumps. Bulletin 100, Eastern Industries, Inc.

Positive Pressure Pumps.....K541
12-p. bulletin contains engineering data, diagrams, and suggestions about positive pressure pumps. Bulletin 200, Eastern Industries, Inc.

Electric Tiering Truck.....K542
4-p. bulletin describes features, uses, and gives specifications for electric tiering truck. Bulletin No. 701, Lyon-Raymond Corp.

Steam Traps.....K543
30-p. catalog contains capacity tables, installation diagrams, and selection data, charts and formulae for specific applications for steam traps. Catalog No. 250, W. H. Nicholson & Co.

Floor Resurfacer.....K544
4-p. bulletin describes advantages and application of resurfacer for floors of all types. Stonhard Co.

Crane Scales.....K545
Catalog describes use, construction and advantages of hydraulic crane scales for measuring loads while in transit. Load capacities and dial sizes included. Bulletin No. 501, The A. H. Emery Co.

Steam Trap.....K546
Bulletin T-1739 describes impulse steam trap with body of Type 416 stainless steel. Yarnall-Waring Co.

Water Heaters.....K547
4-p. bulletin describes and gives capacities for water heaters using steam to heat flowing cold water. Beltran Associates, Inc.

Nickel Corrosion-Resistance.....K548
24-p. booklet discusses resistance of nickel and its alloys to corrosion by caustic alkalies. Methods of testing as well as results given. Includes over 40 tables. Bulletin T-6, The International Nickel Co.

Air Heaters.....K549
4-p. bulletin describes applications, construction and operation of air heaters for industrial ovens and dryers. Gas Appliance Service, Inc.

Lubrication Systems.....K550
8-p. bulletin contains case studies describing advantages of centralized lubrication systems. The Farval Corp.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 4288, Sec. 510, P. L. & R., New York, N. Y.

Technical Data Service

CHEMICAL INDUSTRIES

309 W. Jackson Blvd.

Chicago 6, Illinois

. . . in your detergent

*Carbose** can do it. Carbose is Wyandotte's "detergency promoter." As little as 1% of Carbose added to a synthetic detergent can increase soil removal and whiteness retention properties by 20 to 50%.

Here's what three laundries say about detergents promoted with Wyandotte Carbose:

"We got soft water quality in a hard water plant with a decrease in the cost of supplies."

"We got an outstanding improvement . . . reduced the cost of our supplies by 24.4%."

"Significant increase in quality . . . reduction in cost of supplies 50%."

These are just a few of hundreds of field observations made with different formulations of Carbose with synthetic detergents and builders. We think they show that it might be worth while for you to investigate Wyandotte Carbose. Why not write for samples today?

*Reg. U. S. Pat. Off.

SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

Wyandotte Chemicals Corporation
Wyandotte, Mich. • *Offices in Principal Cities*

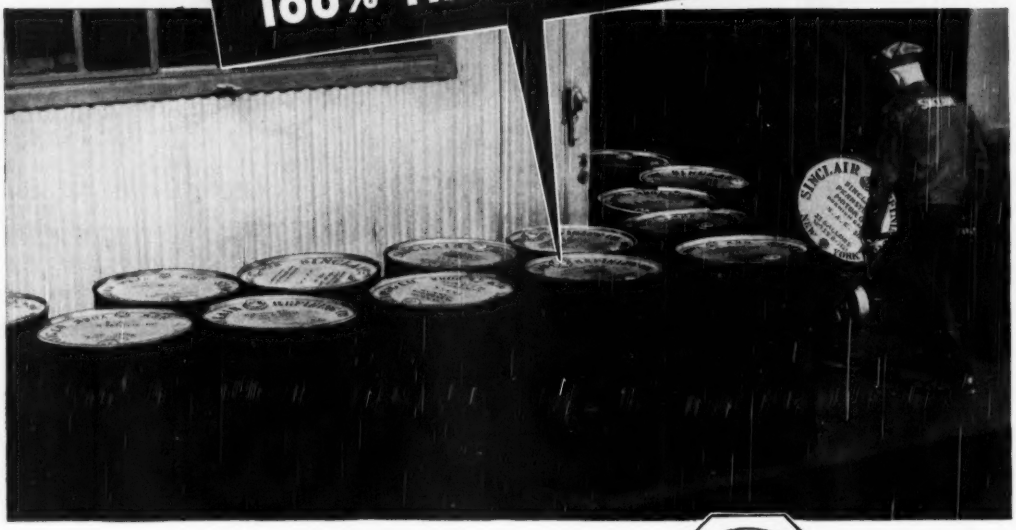
Wyandotte
REG. U. S. PAT. OFF.

SINCLAIR'S

Improved Pennsylvania Motor Oil Plus

and other famous motor oils are

100% TRI-SURE PROTECTED



SINCLAIR—a name renowned for quality—is announcing an improved Sinclair Pennsylvania Motor Oil, which attains a new high in performance and quality.

To protect that quality—to preserve the purity and performance of every gallon of Pennsylvania Motor Oil Plus—Sinclair drums are equipped with Tri-Sure Closures*.

Since 1936, the Sinclair Refining Co. has standardized on Tri-Sure protection for all of its lubricating oils in drums—because its experience has confirmed its selection of Tri-Sure Closures as the *dependable* safeguard against leakage, seepage, pilferage and substitution.

Companies which insist that their packaging be worthy of their product make it standard policy to specify "Tri-Sure Closures". On *your* next drum order, take this simple, certain, proven way to provide the security that all fine petroleum and chemical products deserve.

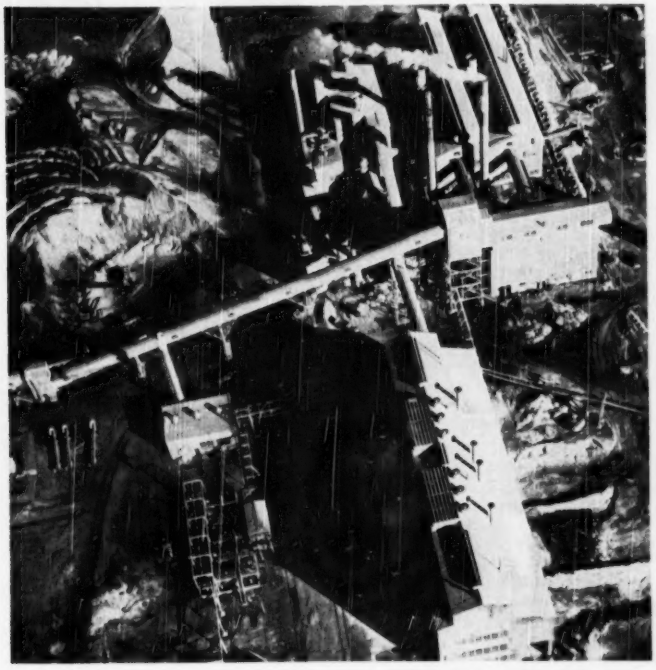
Tri-Sure
Reg. U. S. Pat. Off.

CLOSURES

*The "Tri-Sure" Trademark is a mark of reliability backed by 28 years serving industry. It tells your customers that genuine Tri-Sure Flanges (inserted with genuine Tri-Sure dies), Plugs and Seals have been used.

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

NEWS OF THE MONTH



Present phosphorus operation of Westvaco Chemical Div. at Pocatello, Idaho, to be enlarged by a third electric furnace for elemental phosphorus.

New Construction

• **Phosphorus boom continues:** Westvaco Chemical Div. of Food Machinery & Chemical Corp. will construct a third electric furnace unit for elemental phosphorus at its Pocatello, Idaho, plant where two furnaces are presently in operation. Power will come from the hydroelectric system of the Idaho Power Co.; phosphate rock from near-by deposits.

Simultaneously, a plant for processing phosphorus into the usual grades of soluble phosphates used by soap, textile, oil and chemical industries will be erected at Lawrence, Kansas. This site, 35 miles west of Kansas City, Mo., has been selected with an eye toward future expansion into other chemical operations.

Bechtel Corp., San Francisco, has the engineering-construction contracts for detailed design and construction of these units. Completion of both is expected by late spring 1951.

• **A new plant at South Charleston, W. Va.,** to produce Vinylite dispersion resin VYNV.3 by a new production method has been planned by Union Carbide and Carbon Corp. The new plant, to be built and operated by its Carbide and Carbon Chemicals Div., is scheduled for mid-1951 operation.

• **Its second hypersorption unit,** with a charging capacity five times that of the first unit it has operated successfully since June 1947, is being built for The Dow Chemical Company by Foster Wheeler Corp. (CI Newsletter, April 1950, p. 492). Three pure product streams—C_1's and lighter from the top, C_2's as the middle cut, and C_3's and heavier as the bottom fraction— will be separated from the cracking plant effluent.

• **The Portland Cement Association's** new $3-million research and development laboratories located about 16 miles northwest of Chicago were recently dedicated. The two buildings of the new research center include more than thirty individual laboratories, testing and curing rooms. Conditions of arctic cold, desert dryness and tropical heat are duplicated, with temperatures ranging from —20°F—130°F. Variations in relative humidity from 15-100% are also possible in these rooms. The new center is the largest and most completely equipped laboratory in the world devoted exclusively to research in Portland cements and concretes.

• **Two new coke batteries** of 87 ovens each have been scheduled at Clairton Works of U. S. Steel's Carnegie-Illinois Steel Corp., replacing two batteries of old ovens. Actual construction of the first new battery is expected to start early in September, work on the second starting about sixty days later. They are scheduled to get into operation about one year after start of construction work. Koppers Co., Inc., has been awarded the contract for the work.

• **First shipment of metallic sodium** from its new $10 million sodium and chlorine plant in Ashtabula, Ohio, has been made by National Distillers Chemical Corp. Chlorine is also being delivered to the Hooker-Detrex, Inc., trichlorethylene plant adjacent to National Distillers.

• **The Dow Chemical Co.'s Texas Div. expansion** (CI, June 1950, p. 927) will be a $30 million operation. Increased facilities are contemplated for production of ethylene, chlorine, styrene, glycols, vinyl chloride, vinylidene chloride and power. Construction is expected to start shortly.

• **In a statement disclaiming** that Guy G. Gabrielson has any financial interest in Carthage Hydrocol, Inc., although he is president and general counsel for the company, Frank M. Dawson, vice-president of Carthage Hydrocol, revealed that interested private companies have invested $21.5 million in the company and that the Reconstruction Finance Corp. has agreed to loan it $18.5 million to complete its financing. Construction of Carthage's Brownsville, Texas plant is practically complete, and it is expected to begin operations in the very near future.

• **Acheson Colloids Corp.,** Port Huron, Mich., is continuing expansion of its dispersed pigments production facilities with a new structure to be ready for occupancy by August of this year. Austin Co., of Cleveland, has the contract for the building.

• **A $1-million improvement program** at the Taunton, Mass., plant

is about to be launched by the General Electric Co. In addition to making this plant one of the largest plastics operations in the country, consolidation of operations will leave more room at the company's Pittsfield, Mass., plant for expansion of several chemical manufacturing activities.

• **E. I. du Pont de Nemours & Co.** has purchased a 225-acre site near Memphis for possible future location of a new chemical plant. The area in which the site is located has recently been rezoned from "agricultural" to "unrestricted," and at a special hearing on rezoning the site area, a Du Pont representative indicated that the new plant would involve expenditure of "a number of million dollars" and will be "one of the biggest things to come to Memphis in recent years." Du Pont says it has no definite plans for construction at this time, nor for the product to be made.

Ownership Changes

• **The Pacific Chemical plant** of American-Marietta Co., Los Angeles, Calif., has been purchased by Wyandotte Chemicals Corp. for an undisclosed sum. Wyandotte is revamping the property to provide a Pacific Coast manufacturing unit to serve its branches in Los Angeles, San Francisco, and Seattle. Pacific Chemical's plant and sales personnel will be absorbed by Wyandotte.

• **Cherokee Ordnance Works,** Danville, Pa., has been leased by the Department of the Army to Merck & Co., Inc., under an agreement, providing for a 15-year lease at a yearly rental of $30,000 and eventual purchase. Merck will manufacture medicinal chemicals and fine chemicals at that site. Built and operated for the Government during the war by Heyden Chemical Corp., Cherokee Ordnance plant has been maintained by the Government in a stand-by condition since the war. Facilities include 19 major buildings and a number of smaller structures, plus a power plant, storage tank, settling basins, and other installations.

• **Controlling stock of the H. K. Ferguson Co.,** industrial engineers and builders, has been bought by Morrison-Knudsen Co., Inc. Ferguson, operating at record levels during the postwar period, has been especially active in the chemical processing industries.

Foreign

• **France,** which until two years ago had to import its penicillin, produced 1,800 billion units in March 1950, and will soon be able to export the drug, according to Dr. Janot, French member of the World Health Organization's committee of experts on antibiotics.

Robert B. Boyd (left), appointed assistant general sales manager, Oldbury Electro-Chemical Co.; and Allen T. Cole, formerly chief engineer, named manager of the Davison Chemical Corp.'s Phosphate Rock Division. Mr. Boyd has been with the Oldbury sales department since 1936.

General

• **The suit of the Port of New York Authority** against Boyce Motor Lines, Inc. and the J. T. Baker Chemical Co. for damages in the Holland Tunnel carbon disulphide explosion last year was settled for $300,000. A spokesman for Boyce, the carrier of the chemical manufactured by Baker, said that its share of the settlement was $50,000. The Authority had made a claim of $800,000.

• **In its first civil court action** to control pollution of Maryland waters, the Maryland Water Pollution Control Commission was backed up by the courts in its case against the A. H. Smith Sand and Gravel Co., Branchville. An associate judge of the Seventh Judicial Circuit gave the offending company 60 days to correct pollution of Indian Creek near Washington, D. C. The result of this suit is expected to establish a precedent that will enable the Commission to carry out its work in similar cases.

• **Manufacturing Chemists' Association, Inc.** and Plastic Materials Manufacturers Association, Inc. in regular meetings last month voted unanimously to consolidate their organizations and activities under the name Manufacturing Chemists' Association, Inc. All members of the former associations become members of the new corporation.

The consolidated organization will continue all of the activities of the previous individual associations. The Washington offices will be combined under the direction of M. F. Crass, Jr., association secretary. F. H. Carman, who has been secretary of PMMA, will continue to direct the plastics programs.

Washington

• **The decision in the U. S. Department of Justice's** 13-year anti-trust

now TANK TRUCK DELIVERY

OF Barrett*

"elastex"

28-P PLASTICIZER

For your greater convenience—and as a saving to you—we now make express tank truck deliveries of "ELASTEX" 28-P Plasticizer (Dioctyl Phthalate), to points within a 100-mile radius of our stations at Malden, Mass., Edgewater, N. J., and Philadelphia, Pa.; also full transport truck loads of one or more Barrett Plasticizers to points within 400 miles of Philadelphia. Convenient stock points provide prompt delivery service in drums for other areas. Phone, wire or write.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
In Canada: The Barrett Company, Ltd.,
5551 St. Hubert St., Montreal, Que.

*Reg. U. S. Pat. Off.

action against the Aluminum Company of America has established the legality of Alcoa's present position in the post-war market. The Department of Justice's request that Alcoa sell some of its plants and facilities was turned down; Alcoa's purchase of the Government St. Lawrence smelting plant was sustained; and Alcoa's patent structure and royalty terms were upheld. Substantial stockholders in both Alcoa and Aluminum Limited are required to sell their stock in one company or the other; and the court retains jurisdiction of the case for five years.

• **The Economic Cooperation Administration** now has 510 officials of business service groups serving as field counselors to small businessmen throughout the nation. Located in trade centers throughout the country, they provide small business enterprises with practical, personalized counsel on export opportunities under the Marshall Plan.

Company Notes

• **Koppers Company, Inc.,** has received a contract from Nissin Chemical Co., Osaka, Japan, to do the engineering on a liquid purification plant to remove sulfur from various industrial gases. The Nissin company specializes in the manufacture of sulfuric acid, synthetic fertilizers, and chemicals which are related to these manufacturing processes. Details of the contract have been approved by Japanese officials and by American officials in Japan.

• **McClanahan Oil Co.,** Grand Rapids, Mich., has changed its name to Great Lakes Oil & Chemical Corp. The company has a plant for making bromine and bromides at Filer City, Mich.

• **Consolidated Engineering Corp.** will build a half-million-dollar instrument plant in Pasadena, Calif.

• **Sales and technical service headquarters** for Marvinol vinyl resins have been transferred from Baltimore, Md., to Naugatuck, Conn., by Naugatuck Chemical division, United States Rubber Co. The move is aimed at broadening research activities in vinyl resins and improving customer service.

• **The Pennsylvania Salt Manufacturing Co.** has opened a new district sales office at 1114 Buhl Building, 535 Griswold Street, Detroit. Harry G. Potts, district sales manager of Pennsalt's Heavy Chemicals Department, will be in charge. With the opening of the new Detroit office, Pennsalt is discontinuing its former sales office at its Wyandotte plant.

• **The consulting chemical engineering firm** of R. S. Aries & Associates has moved its executive offices to 400 Madison Avenue, New York 17, N. Y., from Brooklyn, N. Y.

CALENDAR *of* EVENTS

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS, The Wentworth, Portsmouth, N. H., Sept. 28-30.
AMERICAN CHEMICAL SOCIETY, 118th national meeting, Chicago, Sept. 3-8.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Minneapolis, Minn., Sept. 10-13.
AMERICAN OIL CHEMISTS SOCIETY, fall meeting, Sir Francis Drake Hotel, San Francisco, Sept. 26-28.
DRUG, CHEMICAL AND ALLIED TRADES SECTION, New York Board of Trade, annual meeting, Shawnee Inn, Shawnee-on-Delaware, Pa., Sept. 21-23.
INDUSTRIAL PACKAGING AND MATERIALS HANDLING EXPOSITION, Philadelphia, Pa., Sept. 26-29.
INSTRUMENT SOCIETY OF AMERICA, instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y., Sept. 18-22.
NATIONAL CHEMICAL EXPOSITION, Chicago Coliseum, Chicago, Sept. 5-9.
NATIONAL PETROLEUM ASSOCIATION, Hotel Traymore, Atlantic City, N. J., Sept. 13-15.
WESTERN PACKAGING EXPOSITION, Civic Auditorium, San Francisco, Aug. 14-16.

PERSONNEL

Company Officers

• John L. Gillis, general manager of **Monsanto Chemical Co.'s** Merrimac Division at Everett, Mass., has been elected a vice president of the company.

• David Duke Cochrane has been elected a vice president of **Godfrey L. Cabot, Inc.**, Boston. Since 1945, he has been chief engineer and manager of the New Projects Section.

• Harold B. Leland has been appointed vice president-manufacturing of the **Hood Rubber Co.**, Watertown, Mass., a division of The B. F. Goodrich Co. He has been manager of employee and industrial relations at Hood since 1937.

• Joseph van Ackeren, vice president and assistant general manager, Engineering and Construction Division, **Koppers Co., Inc.**, has announced his retirement. He has been retained, however, by Koppers as a consultant.

George M. Carvlin, vice president, Engineering and Construction Division, has been made assistant general manager of the division.

Lawrence R. Sperberg (left), named chief chemist, J. M. Huber Corp.; and Elmore H. Northey, named assistant to the vice-president in charge of research, American Cyanamid Co. Mr. Sperberg was previously with the Phillips Petroleum Co. Dr. Northey has been administrative director of Cyanamid's laboratories.

Production

• John R. McConnell, assistant manager of the Belle, W. Va. works of the **Du Pont Co.'s** Polychemicals Dept., has been appointed manager of the new nylon intermediates plant being built at Victoria, Texas.

• Paul F. Preston has been appointed manufacturing manager of the **General Electric Co.'s** Chemical Department.

Sales

• Charles H. Fuchs who for many years has been connected with the pharmaceutical industry both as production and plant manager and in sales has been appointed as sales manager for **Mann Fine Chemicals, Inc.**

Research

• James M. Gillet has been named assistant to the president of **Victor Chemical Works.** He has been with Victor since 1923, and in recent years has been director of industrial research.

• **Nopco Chemical Co.**, Harrison, N. J. has appointed John R. Foy as director of its Biological Laboratories.

Died

• **A. H. Winheim,** in an automobile accident on June 3. He had been president of the Planetary Chemical Co. and of the American Leather Chemists Association.

DOUBLE CHECKED SHARPLES TRADE MARK CHEMICALS

SHARPLES

DI-tert-AMYLPHENOL
DI-sec-AMYLPHENOL

Both of the Sharples Diamylphenols are of interest as intermediates for organic synthesis.

The tertiary isomer can be used for resin manufacture, for lubricating oil additives and for rubber chemicals. It also finds application as a plasticizer and as an anti-skinning agent for surface coatings.

PROPERTIES:

	Di-tert-amylphenol	Di-sec-amylphenol
Color	lt. yellow to brown	clear amber
Physical State at Room Temperature	liquid	liquid
Specific Gravity	0.93-0.94 @ 30°C.	0.91-0.93 @ 20°/20°C.
Distillation		
Initial Boiling Point	275°C. min.	— — —
Not less than 95% below	300°C.	— — —
95% between	— — —	280-305°C.
Final Boiling Point	310°C. max.	— — —

Write to Dept. A for specifications, prices and further information.

Semi-commercial quantities of para-sec-amylphenol and poly-sec-amylphenol are also available.

Sharples Chemicals Inc.

350 Fifth Avenue, New York 1, N. Y.
80 East Jackson Boulevard, Chicago 4, Ill.
Executive Offices: 123 S. Broad St., Phila. 9, Pa.

CHEMICAL MARKETS

Specialties Become No. 2 Chemical Export Group

Chemical specialties comprise the second largest export group among chemicals and related products, according to the U. S. Department of Commerce. Contrary to reductions in other large groups in the past 2 years, the total for specialties increased 19 per cent in 1949 over that in 1948 and rose more than 400 per cent above 1939. Explosives were included in this group in 1949, but, judging from previous exports of these products, it may be assumed that a large portion of the increase resulted from greater sales abroad of other items.

The specialties group has had a large part in the expansion of chemical export trade since 1939. Not only have there been tremendous jumps in shipments of old-established commodities but hundreds of new ones have been developed and introduced to world markets. A few of the prominent ones that were sufficiently important to be classified separately are shown in the accompanying table; many others are included in chemical specialties, n.e.s. In 1949 exports of this class were more than 50 per cent higher than in 1948 and 94 per cent greater than in 1939.

Antiknock compounds, one of the new items, constituted 12 per cent of total exports of chemical specialties in 1949. Synthetic gums and resins and plastics materials have been popular export items over the whole period from 1939, and in 1949 made up almost a third of the group total.

Exports of insecticides and disinfectants amounted to $28 million in 1949, compared with $5 million in 1939, and represented 15 per cent of the total. DDT, one of the most-favored wartime products, boosted sales of insecticides in 1949 and kept them at the 1948 level. Virtually the whole world provides the market for these products.

Tanning and textile-specialty compounds together increased over 400 per cent in 1949 over the 1939 figure, but dropped 30 per cent from 1948 to only 3 per cent of the total. Flavoring extracts rose about 1,200 per cent above 1939 exports and 30 per cent over 1948. Organic surface-active agents and hydraulic brake fluids were among the new items exported in 1949; shipments amounted to about $12 million. They had almost global distribution, but the chief purchasers were the Republic of the Philippines, Canada, India, Union of South Africa, and the larger South American countries.

Surface-Active Agents Hit 426 Million Pounds in 1949

Production of surface-active agents in 1949 reached a grand total of 425,655,400 pounds, according to the Preliminary Report on Surface-Active Agents of the Chemical Division, U. S. Tariff Commission in its series on Sales and Production of Synthetic Organic Chemicals. Sales totaled 335,-

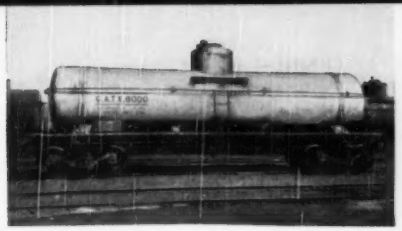
U. S. EXPORTS OF CHEMICAL SPECIALTIES BY PRINCIPAL PRODUCTS, 1939 AND 1948-49

(Quantity in thousand pounds, value in thousand dollars)

Item	1939		1948		1949	
	Quantity	Value	Quantity	Value	Quantity	Value
Nicotine sulfate	501	$303	390	$459	1,222	$1,326
Copper sulfate	29,240	1,157	84,270	6,515	63,434	4,321
D.D.T. 100% basis	(1)	(1)	(1)	(1)	19,187	4,661
Insecticides, agricultural, household, and industrial, n.e.s.	17,182	2,679	79,961	18,463	75,027	16,025
Disinfectants, household and industrial	3,153	291	5,601	1,188	5,538	1,107
Textile specialty compounds	10,426	792	27,555	6,263	18,035	4,241
Tanning specialty compounds	4,296	342	18,379	2,279	14,969	1,726
Water softeners, purifiers, etc.	3,162	373	10,709	1,427	8,776	1,387
Metalworking compounds	3,111	368	12,192	1,352	14,579	1,594
Synthetic gums and resins, total	11,897	2,378	123,138	42,946	120,536	41,243
Alkyd	(2)	(2)	13,652	4,226	14,756	3,668
Tar-acid	(2)	(2)	31,614	6,712	16,271	3,958
Urea	(2)	(2)	11,044	3,029	10,640	3,161
Cellulose plastics materials	7,502	5,769	17,677	13,263	18,439	16,693
Organic surface-active agents	(1)	(1)	(1)	(1)	49,622	8,802
Other specialty cleaning and washing compounds	4,480	433	48,263	6,276	37,604	4,960
Polishes, metal, shoe leather, auto, and waxes	7,424	1,392	13,953	4,228	14,259	4,111
Flavoring extracts, natural and synthetic	n.a.	657	n.a.	6,610	n.a.	8,552
Organic rubber compounding agents, not of coal-tar origin	1,152	324	5,684	2,103	4,085	1,704
Antiknocks compounds, not of petroleum origin	(2)	(2)	3,826	15,894	4,971	22,715
Hydraulic brake fluids	(1)	(1)	(1)	(1)	10,218	3,288
Chemical specialty compounds, n.e.s. [4]	.....	13,136	.....	16,795	.....	25,494
All other chemical specialties	.....	5,650	.....	10,572	.....	12,374
Total	.....	36,044	.....	156,632	.....	[5]186,324

n.a. Not available. [1] Classification number established in January 1949. [2] No separate classification; included in total. [3] Number established in 1946. [4] In 1949 explosives were grouped with chemical specialties into "Special Category" in export statistics. [5] Revised since last published, but subject to further revisions.

Source: Compiled in Chemical Branch, Office of International Trade, from data supplied by the Bureau of the Census, U. S. Department of Commerce.



The first aluminum tank car ever built was produced by General American in 1928. It was GATX 8000—built specifically for Glacial Acetic Acid.

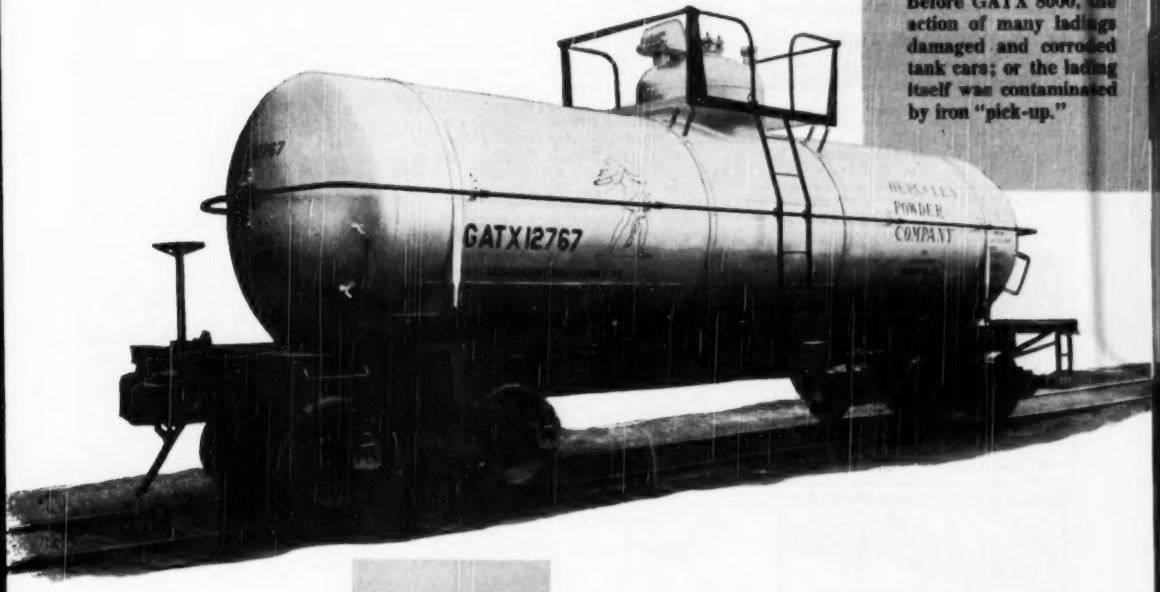
GATX *aluminum cars for chemicals*

modern **GATX** aluminum cars now carry:

Glacial Acetic Acid • **Formaldehyde**
Hydrogen Peroxide Bleach • **Fatty Acids**
Acetic Anhydride • **Naphthenic Acid**
Butylaldehyde • **Water White Rosin**
Glycerin • **Nylon Salt Solution**
52% Hydrogen Peroxide • **Nitrogen Fertilizer**
Oleic Acid • **Nitric Acid**
Trichlorobenzene • **Ammonium Nitrate**

why aluminum cars?

Before GATX 8000, the action of many ladings damaged and corroded tank cars; or the lading itself was contaminated by iron "pick-up."



GATX GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street • Chicago 90, Illinois

DISTRICT OFFICES *Buffalo • Cleveland • Dallas • Houston • Los Angeles New Orleans • New York • Pittsburgh • St. Louis • San Francisco Seattle • Tulsa • Washington*

EXPORT DEPT *10 East 49th Street, New York 17, New York*

417,800 pounds, with a total sales value of $82,838,800, and a unit value of 25 cents.

Total production of cyclic surface-active agents was 223 million pounds, at a unit sales value of 19 cents a pound, compared with 202 million for the acyclic, at a unit value of 30 cents a pound. Leading category among the cyclics was the sulfated and sulfonated types with 207 million pounds produced. Biggest sub-group was the sulfated and sulfonated alkyl benzenoid compounds, which includes alkyl aryl sulfonates, and sulfated and sulfonated phenyl ethers, substituted biphenyls, and phenylphenol derivatives. Of these, 147 million pounds were produced with a unit sales value of 18 cents.

Among the acyclic types, the sulfated and sulfonated materials were the leaders with 172 million pounds at a unit sales value of 30 cents. Sulfonated and sulfated esters and alcohols bulked largest in this category with 93 million pounds at a unit sales value of 26 cents.

Inorganics Maintain High Production Levels

United States production levels of industrially important chemicals were generally higher for April than those reported for March 1950, or for the corresponding period of last year, according to the Department of Commerce. A comparison of April 1950 quantities with those shown for April 1949 indicates an increase for all of the chemicals included in this survey.

Market Review

The rising price trend in important chemicals continued with advances in cokeoven benzol, toluol and xylol. Tankcar price of benzol was raised 3¢ to 25¢ a gallon, f.o.b. ovens, while toluol and xylol were at 23¢ and 24¢ respectively after a 1¢ raise. Following the benzol advance, synthetic phenol, aniline oil, and styrene monomer were raised ¾¢, 1¢ and 1½¢ respectively to establish respective tankcar prices of 13½¢, 15¢ and 16½¢ a pound. Paradichlorobenzene, monochlorobenzene, orthodichlorobenzene, and trichlorobenzene had all been previously upped because of the chlorine situation and the impending benzol raise. New prices (per pound; Eastern zone): paradichlorobenzene 12¢, in 200-pound drums, carlots; orthodichlorobenzene, 7¾¢, tankcars; monochlorobenzene, 7¢ tankcars; and trichlorobenzene, 9¢ tankcars. Benzol continued firm at the higher level, with no easing of the tight supply situation.

Outstanding development in solvents was a 4¢ per gallon advance in industrial alcohol, with an increase of 2¢ in the price differential between tankcars and carlot drum quantities. Where previously this spread had been 10¢, it was upped to 12¢. The new tankcar price of tax-free ethyl alcohol is 39¢ a gallon; proprietary solvent alcohol, 42½¢; SD No. 1, 41¢, and SD 2-B, 40¢. The increased cost of handling drums responsible for increasing the alcohol differential also caused a ¼¢ a pound advance in drum prices of acetone, amyl acetate, butyl acetate, ethyl acetate, fusel oil, propyl acetate and propyl alcohol.

Higher levels for alkali that became general over the past period were not exceptions in the heavy chemical market. Both muriatic and sulfuric acid were advanced 25¢ per cwt. to establish muriatic prices of $1.90 for 18° and $2.15 for the 20° acid; and sulfuric prices of $1.65 for the 60° and $1.90 for the 66° acid, all prices for carboys in carlots. Price advances for caustic potash and carbonate of potash were scheduled by a major producer, as was that of sodium nitrite, to be raised $1 a cwt, to make the carlot price in barrels $7.25. A movement in the opposite direction was Solvay Sales Division's cancellation of the price raise on four liquid caustic soda items that it had announced for July 1.

New schedules for carbon tetrachloride showed prices in most categories 15¢ to 25¢ a cwt. above previous quotations. Sodium hyposulfite was also advanced 25¢ a cwt., establishing the photographic grade at $4.75 a cwt. in drums; and technical, $3.75 per cwt., bags, truckloads.

The upward surge of metals carried over to chemical derivatives, with copper, nickel, and aluminum compounds being advanced. Copper sulfate crystals went from $7.35 to $8.10 per cwt. in two steps. Monohydrate rose to $13.30 per cwt. and the tribasic, $18.10. Other copper derivatives also were upped twice, setting these prices per pound: Chloride, 20¼¢; nitrate 25½¢; hydrate, 27½¢; cyanide 48½¢. Aluminum chloride went to 11¢ a pound after a 1¢ raise. Advances of 2¢ to 4¾¢ a pound in nickel salts established the following prices: acetate, 53¢; chloride 27¢; carbonate, 53¼¢; formate, 49¾¢; sulfate, 20¢ and nitrate, 26½¢.

Paint manufacturers' raw material prices also were raised with the price of metals. Lithopone went up ¼¢ to 6½¢ a pound, while zinc oxides were raised ⅝¢ to 1¼¢ a pound to establish these prices: lead free, 14¢; 35% leaded, 13¾¢; 50% leaded, 13⅝¢; red seal, 15¼¢; white seal, 16¼¢; and green seal, 15¾¢. Cadmium lithopone pigments were increased from 7¢ to 10¢ a pound along with advances in other cadmium derivatives. Copper naphthenate was advanced to 23¾¢ a pound; lead naphthenate, to 20½¢; and zinc naphthenate, to 21½¢ a pound. One reversal of the trend was a ½¢ cut in lead oxides to establish these prices: red lead, 14¼¢; litharge, 13¼¢; and orange mineral, 16.6¢.

In plasticizers, dioctyl phthalate was cut 2¢ to make the tankcar price 36¢ a pound. This was followed by a similar reduction in diisooctyl phthalate, and a ½¢ a pound reduction in dicapryl phthalate. Tricresyl phosphate, on the other hand, advanced 1¢ to 1½¢, depending upon quantity, making the tankcar price 30¢ a pound.

Abstracts of United States Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

U.S. Patents from Official Gazette—Vol. 631, Nos. 2, 3, 4 (Feb. 14-28) and Vol. 632, Nos. 1, 2, 3 (March 7-21)

Organic

Method of making 2-amino-5-substituted 1,3,4-thiadiazoles in which the 5-position substituent is a radical selected from the group consisting of alkyl, alkenyl, aralkyl and cycloalkyl radicals comprising condensing an acyl chloride with thiosemicarbazide in the presence of at least one condensing agent selected from the group consisting of thionyl chloride, thionyl bromide, sulfur mono-chloride, sulfur monobromide, chlorosulfonic acid, chlorides of phosphorus, and bromides of phosphorus, rendering the mixture alkaline and recovering the 2-amino-5-substituted-1,3,4-thiadiazole. 2,497,825. Monsanto Chemical Co.

1-alkyl-2,5-dimethylpyrrolidines. 2,497,839. Armour & Co.

Direct oxidation of an organic compound containing an ether linkage having the graphic formula R-O-R' wherein R and R' each is a radical selected from the group consisting of the alkyl and aralkyl groups to the corresponding carboxylic acid which comprises treating a solution of a metal ion in a lower aliphatic acid with an aldehyde and a gaseous oxidizing medium to form a catalyst solution, simultaneously introducing the ether-type compound and additional aldehyde into the solution, oxidizing the ether-type compound of the resulting solution of catalyst compound and aldehyde by gaseous oxidizing medium, in the liquid phase, and recovering the acid. 2,497,889. Eastman Kodak Co.

Removing acid gases from hydrocarbon gas by contacting with an aqueous solution of an ethanol amine in admixture with an aromatic hydrocarbon. 2,497,954. Standard Oil Development Co.

Producing a strong acid liquor extract by the absorption of an isomerous monoolefinic hydrocarbon mixture containing predominantly normal olefins and tertiary base olefins in a strong acid without substantial polymerization of the tertiary base olefins. 2,497,959. Standard Oil Development Co.

Separation of 2:4-dimethyl, 6-tertiary butyl phenol from mixtures containing it and 2:5-dimethyl, 4-tertiary butyl phenol which comprises treating the mixture with an aqueous solution of a hydroxide of an alkali metal to dissolve the 2:5-dimethyl, 4-tertiary butyl phenol and separating insoluble 2:4-dimethyl, 6-tertiary butyl phenol. 2,497,971. Imperial Chemical Industries Ltd.

Purification of a mixture of secondary and tertiary naphthenic alcohols, naphthenic peroxide and ketones to recover tertiary naphthenic alcohols by contacting said mixture with an alcoholate of an amphoteric metal and a primary alcohol. 2,497,997. Union Oil Co. of Calif.

Treating a fatty polyene compound containing double bands in unconjugated relation comprising subjecting said compound to contact with a hydrogen reactable iodine compound as a catalyst to effect an increase in the refractive index and thereafter removing said iodine element from said polyene compound. 2,498,133. Armour & Co.

Separating a primary normal olefin having 3 to 4 carbon atoms from a fluid mixture, which contains propylene and 1-butene, by contacting with solid silver nitrate to form a liquid complex of said olefin; separating; and dissociating said complex. 2,498,204. Socony-Vacuum Oil Co., Inc.

Producing paraformaldehyde by interrupting the concentration when the concentrate contains from 55 to 65% formaldehyde, holding the concentrate at a temperature expressed in °C. varying from the numerical value of the formaldehyde concentration by not more than 7 for a period of time to allow polymerization of formaldehyde, and thereafter subjecting the concentrate to a second stage concentration and drying until a paraformaldehyde assaying not less than 95% formaldehyde is produced. 2,498,206. Cities Service Oil Co.

Chlorinated isomelamines. 2,498,217. American Cyanamid Co.

Biguanide compounds. 2,498,252. Imperial Chemical Industries Ltd.

Preparing alkylidene-succinic esters. 2,498,371. Commercial Solvents Corp.

Preparing a 7-dehydrocholesteryl ester by heating and illuminating a mixture of a cholesteryl ester and N-bromosuccinimide in a saturated hydrocarbon solvent. 2,498,390. American Cyanamid Co.

Preparing unsaturated imines. 2,498,419. Shell Development Co.

1-methyl-4-p-methoxyphenyl-4-propionoxy-piperidine hydrochloride. 2,498,430. Hoffmann-La Roche, Inc.

2-and 4-homocyclyl substituted piperidines. 2,498,431. Hoffmann-La Roche, Inc.

1-branched lower alkyl-4-phenyl-4-acyloxy-piperidines and their acid addition salts. 2,498,432. Hoffmann-La Roche, Inc.

1,3 dimethyl-4-propionoxy-4-phenylpiperidine and acid addition salts thereof. 2,498,433. Hoffmann-La Roche, Inc.

1-lower alkyl-4-cyclohexyl-4-lower fatty acyloxy-piperidines and acid addition salts thereof. 2,498,434. Hoffmann-La Roche, Inc.

Preparing 1,3-dimethyl-4-phenyl-4-hydroxy-piperidine by reacting phenyl lithium with 1,3-dimethyl-4-piperidone and hydrolyzing to produce 1,3-dimethyl-4-phenyl-4-hydroxy-piperidine. 2,498,435. Hoffmann-La Roche, Inc.

Endothermically producing unsaturated aliphatic hydrocarbons from gases containing saturated reaction hydrocarbons of the methane series by effecting combustion of a combustible gas mixture of a combustible hydrogen-containing gas and a combustion-supporting oxygen-containing gas at an elevated combustion-supporting temperature not in excess of 2000°C., in such a manner that at least a portion of the combustible gas mixture is burnt. 2,498,444. John B. Orr, Jr.

Monovinyldibenzofuran. 2,498,473. General Electric Co.

2[2(phthalimido) ethyl] pyridines. 2,498,497. Sterling Drug Inc.

In manufacture of urea by heating carbon dioxide with ammonia under pressure in an inert viscous liquid, the step of separately injecting a heat absorbent consisting of an inert viscous hydrocarbon liquid into the reaction zone, at the same time as the carbon dioxide and ammonia. 2,498,538. Compagnie de Produits Chimiques et Electrometallurgiques Alais.

In crystallizing urea from an aqueous solution, the step of adding a member of the group consisting of cyanuric acid and its inorganic base salts. 2,498,539. Compagnie de Produits Chimiques et Electrometallurgiques Alais.

Chlorination of paraffinic hydrocarbons by introducing the hydrocarbons to be chlorinated and hydrogen chloride into a chlorination zone, introducing cuprie oxychloride, and recovering the chlorinated hydrocarbons. 2,498,546. Socony-Vacuum Oil Co., Inc.

Chlorination of normally gaseous paraffinic hydrocarbons by introducing the hydrocarbon and chlorine, introducing cupric oxychloride, and recovering the chlorinated hydrocarbons. 2,498,552. Socony-Vacuum Oil Co., Inc.

Producing ethylbenzene from an olefin and benzene in the presence of an aromatic hydrocarbon catalyst complex composed of AlCl$_3$. 2,498,567. Monsanto Chemcial Co.

Heating under conditions of reflux nicotinyl chloride hydrochloride with nitrobenzene, and reacting the resulting composition with a metal salt of nicotinic acid to form nicotinic acid anhydride. 2,498,634. U.S.A. as represented by the Secretary of Agriculture.

Reacting a phthalyl amino acid halide with a member selected from the class consisting of amino acids and peptides in the presence of a neutral to weakly alkaline buffer to produce a phthalyl peptide, refluxing the phthalyl peptide with water and a member selected from the class consisting of hydrazine, hydrazine hydrate, and the mineral acid salts of hydrazine to produce a peptide. 2,498,665. U.S.A. as represented by the Secretary of Agriculture.

Dichlorethyl sulphide mixed with the impurities of its composition and stabilized with hexamethylene tetramine. 2,498,684. Jack K. Y. Hum.

Producing benzene sulphonyl thioureas by heating a compound selected from the group consisting of benzenesulphonyl cyanamide and its p-amino and p-acetylamino derivatives with hydrogen sulphide. 2,498,782. Societe des Usines Chimiques Rhone-Poulenc.

Recovery of ethylene from a mixture comprising free hydrogen, ethylene, propane and lighter paraffins by a distillation process. 2,498,806. Phillips Petroleum Co.

Synthesizing mercaptans by contacting a mixture of olefinic hydrocarbons and hydrogen sulfide with a Friedel-Crafts catalyst. 2,498,872. Pure Oil Co.

Perhalocyclohexadienes. 2,498,891. Purdue Research Foundation.

Manufacture of 5-hydroxy-methyl 2-furfural from sucrose, in which a solution of sucrose and water is heated under pressure in an atmosphere of hydrogen. 2,498,918. W. N. Haworth and L. F. Wiggins.

Separation of cyclopentane-neohexane mixtures by azeotropic distillation with methyl formate. 2,498,928. Phillips Petroleum Co.

Ailphatic trithiocarbonates. 2,498,936. Socony-Vacuum Oil Co., Inc.

Depolymerizing a liquid polymer comprising essentially isobutylene dimer by passing said polymer over a catalyst comprising a synthetic surface active silica-alumina. 2,498,999. Gulf Research & Development Co.

Preparation of 1-chloro-2-carboxyanthraquinone by reacting 1-nitro-2-carboxyanthraquinone with an alkali metal sulfite to form 1-sulfo-2-carboxyanthraquinone, acidifying and reacting the acidified mixture with a water-soluble chloride and a water-soluble chlorate. 2,498,003. American Cyanamid Co.

Production of chlorosilanes by heating a copper halide with silicon to reduce the halide and form a silicon-copper mixture, reacting said mixture with hydrogen chloride, and recovering a chlorosilane. 2,499,009. Linde Air Products Co.

Production of an aromatic nitrile by contacting with a catalyst for the vapor phase partial oxidation of benzene and naphthalene, respectively, to maleic and phthalic anhydride, a gaseous mixture containing oxygen, ammonia and an organic compound from the group consisting of the alkyl and alkenyl substituted benzene and naphthalene hydrocarbons. 2,499,055. Allied Chemical & Dye Corp.

8-haloxanthine salts of diarylalkyl dialkylaminoalkyl ethers. 2,499,058. G. D. Searle & Co.

Production of hexachlorocyclohexane having a high content of the gamma isomer by mixing liquid benzene and gaseous chlorine in a reaction zone activated by a source of actinic radiation. 2,499,120. Hooker Electrochemical Co.

Preparing 1,1,1-difluorochloroethane by subjecting a mixture of ethylidene fluoride and chlorine to actinic radiation to form 1,1,1-difluorochloroethane and gaseous HCl. 2,499,129. Allied Chemical & Dye Corp.

Producing ketones from lower-boiling saturated aliphatic ketones by heating the lower-boiling saturated aliphatic ketones with hydrogen in the presence of an alkaline condensation catalyst and a hydrogenation catalyst consisting of palladium. 2,499,172. Commercial Solvents Corp.

Preparing 2-vinyldibenzothiophene by dehydrating 2-(alpha-hydroxyethyl) dibenzothiophene by heating. 2,499,186. General Electric Co.

Quaternated 3,5-dimethylphenyl ethers. 2,499,213. Rohm & Haas Co.

Quaternary ammonium compounds from halomethylated 3,5-dmiethylphenyl polyethers. 2,499,214. Rohm & Haas Co.

Quaternary ammonium derivatives from halomethylated polymers of 3,5-dimethylphenyl ethers. 2,499,215. Rohm & Haas Co.

In isolating and purifying a crystalline alkylated phenol from an acidic crude mixture of the alkylated phenol by washing the crude mixture with water, agitating with an aqueous alcohol solution in which the alkylated phenol has slight solubility, cooling until the mass becomes a slush containing crystals of the alkylated phenol, and separating said crystals, the improvement which comprises adding C$_{12}$ to C$_{18}$ long chain alcohol sulfates to the aqueous alcohol solution. 2,499,236. Standard Oil Development Co.

2,13-dimethyldodecahydrophenanthrene hydroxy lactones. 2,499,247. G. D. Searle & Co.

2,13-dimethyl-polyhydrophenanthrene lactone derivatives. 2,499,248. G. D. Searle & Co.

2-methyl-7-hydroxy-tetrahydrophenanthrene-carboxylic acid derivatives. 2,499,257. G. D. Searle & Co.

Preparation of 1-phenyl-2:3-dimethyl-4-methyleneamino-pyrazolone by mixing an aqueous solution of 1-phenyl-2:3-dimethyl-4-aminopyrazolone with formaldehyde and separating 1-phenyl-2:3-dimethyl-4-methyleneamino-pyrazolone. 2,499,265. Societe des Usines Chimiques Rhone-Poulenc.

Substituted glycinamides, corresponding to the formula, $R_1NHCH_2CONHR_2$, wherein R_1 and R_2 are both monophenalkyl radicals having 3 carbon atoms in the alkyl chain; and the non-toxic salts of said glycerinamides. 2,499,352. Wyeth Inc.

Surface-active oxyalkylated derivative of a diphenylolmethane. 2,499,360. Petrolite Corp., Ltd.

Oxyalkylated phenol-aldehyde diols and derivatives thereof. 2,499,361. Petrolite Corp., Ltd.

Oxyalkylated phenol-aldehyde diols and derivatives thereof. 2, 499,362. Petrolite Corp., Ltd.

Oxyalkylated phenol-aldehyde diols and derivatives thereof. 2,499,363. Petrolite Corp., Ltd.

Oxyalkylated phenol-aldehyde diols annd derivatives thereof. 2,499,364. Petrolite Corp., Ltd.

Sulfonated dialkyl thio-ether, in which each alkyl group contains from 6 to 12 carbon atoms. 2,499,377. Standard Oil Co.

Esters of α-acyloxy acrylic acids. 2,499,392. Eastman Kodak Co.

Esters of α-acyloxy acrylic acids. 2,499,393. Eastman Kodak Co.

Trialkyl ammonium halides of benzhydryl-aminoethyl ether. 2,499,417. Parke-Davis & Co.

Polymerizing hydrogen cyanide to its tetramer, by passing liquid hydrogen cyanide into contact with a basic reacting solid catalyst insoluble in liquid hydrogen cyanide, continuously removing the reaction mixture as formed from contact with said catalyst, and separating hydrogen cyanide tetramer. 2,499,441. E. I. du Pont de Nemours & Co.

Preparation of the monohydrochloride of 1-vinylcyclohexene-3 by contacting 1-vinylcyclohexene-3 with hydrochloric acid. 2,499,505. Sun Oil Co.

Oxidation of a low boiling aromatic hydrocarbon by passing an oxygen-containing gas into a liquid mixture comprising a low boiling aromatic hydrocarbon HF and BF_3. 2,499,515. Standard Oil Co.

Production of aromatic halosilanes by reacting an aromatic chlorohydrocarbon with a monoorganodichlorosilane in the presence of a chloride of the group consisting of boron and aluminum chlorides. 2,499,561. Dow Corning Corp.

Method of chlorinating hydrocarbon mixtures. 2,499,578. Allied Chemical & Dye Corp.

In preparation of 2-mercapto, 5-chloro benzothiazole, by reacting 2,5-dichloronitrobenzene with hydrogen sulfide and carbon disulfide in an aqueous solution of sodium hydrogen sulfide, the improvement which comprises introducing the hydrogen sulfide and carbon disulfide into the aqueous reaction medium as a gas mixture. 2,499,627. R. T. Vanderbilt Co., Inc.

In preparation of 2-mercapto-5-chloro-benzothiazole, by reacting 2,5-dichloronitrobenzene with hydrogen sulfide, carbon disulfide and sodium hydrogen sulfide in the presence of water, the improvement which consists in adding elemental sulfur to the reaction mixture. 2,499,628. R. T. Vanderbilt Co., Inc.

Subjecting a mixture of ethylidene fluoride and chlorine to actinic radiation to produce 1,1,1-difluorochloroethane. 2,499,629. Allied Chemical & Dye Corp.

Preparing dinitrohexachlorobutanes by reacting the dimers of trichloroethylene with nitrogen tetroxide. 2,499,648. Canadian Industries Ltd.

Quaternary ammonium salts of bis-quinolyloxy-ω,ω'-alkanes. 2,499,661. Societe des Usines Chimiques Rhone-Poulenc.

Preparation of 2-phenyl-anthraquinone comprising the formation of the sulfonic acid of 2-phenylanthraquinone by the action of concentrated sulfuric acid on 2-(4-phenylbenzoyl)-benzoic acid, and hydrolyzing off the sulfonic acid group in the presence of an aqueous solution of a mineral acid. 2,499,702. Buffalo Electro-Chemical Co., Inc.

Obtaining monocarboxylic acid esters, by reacting tetrahydrofuran with an anhydride of an aliphatic monocarboxylic acid in contact with boron trifluoride. 2,499,725. E. I. du Pont de Nemours & Co.

Separating mixtures of tocopherols. 2,499,778. Eastman Kodak Co.

5-alkoxy sebacic acid. 2,499,797. E. I. du Pont de Nemours & Co.

Manufacture of diphenyl sulfoxide by contacting diphenyl sulfide with gaseous chlorine in the presence of water. 2,499,822. Allied Chemical & Dye Corp.

Method of making fluorinated organic compounds having molecular formulae selected from the group C_2F_6, C_2ClF_5 and $C_2Cl_2F_4$, which comprises reacting an unsaturated chlorine containing aliphatic compound having 8 carbon atoms selected from the group consisting of an undecachloro-octene and its dehydrochlorination products with a fluorinating agent selected from the group consisting of the pentavalent fluorides of antimony and arsenic. 2,499,833. U.S.A. as represented by U. S. Atomic Energy Commission.

Production of 1-chloro-2,2-dimethyl-3-amino propane by passing hydrogen into contact with 1-chloro-2-cyano-2-methyl propane in the presence of nickel. 2,499,847. E. I. du Pont de Nemours & Co.

Aliphatic carboxylic acid ester of 3,3,5-trimethyl-1-hexanol. 2,499,848. E. I. du Pont de Nemours & Co.

In producing a liquid alkyl silicone the steps comprising hydrolyzing mono-alkyl trichlorosilane by pouring an ether solution of the trichloride onto ice, whereby a silanol is produced which is dehydrated to produce a liquid condensation product. 2,499,865. E. I. du Pont de Nemours & Co.

Saponifying wool grease with alkali, partially neutralizing the saponified mass with a mineral acid, and extracting unsaponifiable substances in the reaction mass with a halogenated aliphatic hydrocarbon solvent. 2,-499,877. Nopco Chemical Co.

Production of xylidine by hydrogenation in the vapor phase of nitroxylene. 2,499,918. Allied Chemical & Dye Corp.

Aryl-substituted valeric acids. 2,499,920. Upjohn Co.

Demulsification of water-nitroxylene emulsion with solid sodium carbonate. 2,499,927. Shell Development Co.

Manufacturing thiuram monosulfides by oxidizing in aqueous medium an alkali metal salt of the dithiocarbamic acid derived from morpholine in the presence of an alkali metal cyanide. 2,499,975. Monsanto Chemical Co.

3-higher alkyl-2-oxo-tetrahydrofuran-3-carboxylic acid. 2,499,986. Sterling Drug Co.

In preparing $(RCOCH_2\text{-}SO_3)_2M$ where R represents an alkaryl radical comprising an alkyl group of from about 10 to about 26 carbon atoms, and M represents an alkaline earth metal, the step which consists of reacting a water soluble alkaline earth metal chloride with a compound of the formula $RCOCH_2\text{—}SO_3\text{—}O\text{—}M'$. M' represents an alkali metal, by mixing the alkali metal compound with an excess of the chloride in the presence of a polar solvent. 2,499,997. Sinclair Refining Co.

In producing esters of unsaturated lower fatty acids the improvement which comprises reacting an ester of a monochlor lower fatty acid with ammonia in an alcoholic solution. 2,500,005. Sinclair Refining Co.

Preparing an ester selected from the group consisting of omega-trichloro-alkyl and omega-dichloroalkenyl esters of aliphatic and aromatic carboxylic acids by heating an alpha-trichloro-omega-chloro-alkane, $ClCH_2(C_2H_4)_n\text{-}CH_2\text{-}CCl_3$, where n is a whole number of from one to twelve, with an alkali metal salt of an acid selected from the group consisting of aliphatic and aromatic carboxylic acids in an organic solvent. 2,500,-009. Hercules Powder Co.

2-allyl-chlorophenoxy-2-propanols. 2,500,011. Dow Chemical Co.

Epoxyethylcyclohexane hydroxy ethers. 2,500,016. Canadian Industries, Ltd.

Producing an anhydrous nitrile by suspending an alkali metal cyanide and anhydrous formaldehyde in petroleum ether, adding water to dissolve only a small proportion of the cyanide and formaldehyde and heating. 2,500,018. Frederick C. Bersworth.

Producing polycarboxylic amino acids by condensing formaldehyde with sodium cyanide in a strongly alkaline solution in the presence of an alkali metal salt of an alpha amino acid. 2,500,019. F. C. Bersworth.

Dialkyl alkoxy methane phosphonates. 2,500,022. Oldbury Electrochemical Co.

1,5-pentanediol bis-cyclohexylacetate. 2,500,033. Sun Oil Co.

Bispyridyl compounds containing a silicon atom. 2,500,110. Eastman Kodak Co.

Thioketones. 2,500,126. Eastman Kodak Co.

Preparing cyclammonium quaternary salts containing an N-substituted β-aminovinyl group. 2,500,127. Eastman Kodak Co.

Di-N-oxides of amino-substituted acridines and quinolines. 2,500,131. Ralph L. Evans.

Thio-ether substituted thiazoles and selenazoles. 2,500,142. General Aniline & Film Corp.

Phenolphthalein beta betá-digluocoside octaacetate. 2,500,148. Atlas Powder Co.

Preparation of esters of cyclic acetalacetic acids. 2,500,155. Rohm & Haas Co.

Flash distillation of turpentine. 2,500,194. U.S.A. as represented by the Secretary of Agriculture.

A double salt prepared by fusing together a metal alkyl xanthate, in which the metal is selected from groups I and II of the periodic table and in which the alkyl group contains at least 2 carbon atoms, and a compound selected from the group consisting of metal organo thiophosphites and thiophosphates. 2,500,195. Standard Oil Development Co.

Preparation of an oxo synthesis catalyst by preparing a silica hydrosol, causing to set to a hydrogel, impregnating with decomposable salts of cobalt, thorium and copper, decomposing, activating by heating and reducing with hydrogen. 2,500,210. Standard Oil Development Co.

Preparing 1,1,1-trifluoro-2-bromoethane by heating with antimony trifluoride, hydrogen fluoride and antimony pentachloride. 2,500,218. Eastman Kodak Co.

Production of aliphatic nitrile by reacting a tertiary olefin oxide with ammonia. 2,500,256. Phillips Petroleum Co.

Converting maleic acid to fumaric acid by heating a solution of maleic acid in molten maleic anhydride. 2,500,260. Union Carbide and Carbon Corp.

Producing amino substituted pyrimidines by reacting a member of the group consisting of 2-aminopyrimidine and 2-aminopyrimidine compounds with an aromatic aldehyde in the presence of formic acid. 2,500,283. Pyridium Corp.

Synthesis of substituted pteridines from 2,4,5-triamino-6-hydroxy pyrimidine, a member of the group consisting of alpha, beta-dihalopropionaldehydes and acetals thereof and a member of the group consisting of aminobenzoic acids and salts, esters and amides thereof. 2,500,296. American Cyanamid Co.

Azeotropic distillation of 1-butanol from methyl n-butyl ketone in the presence of a C_7 hydrocarbon. 2,500,329. Stanolind Oil and Gas Co.

Fractionally separating substantially pure ethylene from a mixture containing lower and higher boiling components, a small amount of acetylene and an amount of hydrogen. 2,500,353. Universal Oil Products Co.

In preparation of 1,1 di-p-tolylethane, the step of adding to a mixture of toluene and sulfuric acid, a mixture of toluene and paraldehyde. 2,500,-369. Shawinigan Chemicals Ltd.

Producing norcamphor by reacting bicyclo-(2,2,1)-2-heptene with chlorine to produce 2-chlorobicyclo-(2,2,1)-2-heptene, and hydrolyzing said chlorobicycloheptene to form norcamphor. 2,500,385. Universal Oil Products Co.

Saturated aliphatic fluorocarbon ethers. 2,500,388. Minnesota Mining & Mfg. Co.

Uramidohomomeroquinene. 2,500,444. Polaroid Corp.

Compositions containing glycidyl ethers and oxalic acid. 2,500,449. Shell Development Co.

Mixed mercaptalacetals. 2,500,486. General Aniline & Film Corp.

Production of tetramethylolcyclopentanone by reacting cyclopentanone with formaldehyde in an aqueous solution in the presence of a liquid hydrocarbon coolant inert to the reaction. 2,500,576. Phillips Petroleum Co.

Recovering a 7-dehydrosterol ester from the dehydrohalogenation reaction mixture in which it is formed by dissolving the dehydrohalogenation reaction mixture in an excess of a solvent selected from the group consisting of aliphatic alcohols, ketones, and esters containing not more than 5 carbon atoms. 2,500,576. Nopco Chemical Co.

Preparing a 3-phenoxy alkanal by heating a mixture comprising phenol, a 2-alkenal, and a polymerization inhibitor. 2,500,582. Shell Development Co.

Extractive distillation process for separating the azeotropic distillate mixture of allyl alcohol and allyl acetate. 2,500,596. Shell Development Co.

Making polymeric 2,2,4-tri-methyl-tetrahydroquinoline by reacting hydrogen, in the presence of finely divided palladium, with polymeric 2,2,4-trimethyldihydroquinoline. 2,500,597. Dow Chemical Co.

Hydroxylation of a compound containing an olefinic linkage by reacting said compound with hydrogen peroxide in the presence of formic acid. 2,500,599. Shell Development Co.

Composition comprising an epoxy ether having a 1,2-epoxy equivalency greater than one, devoid of other reactive substituents than alcoholic hydroxyl groups, and a saturated aliphatic diamine. 2,500,600. Shell Development Co.

Preparing tolyldimethylchlorosilane by reacting toluene and tri-methylchlorosilane in mixture with a halide of a metal of the group consisting of aluminum and boron. 2,500,652. Dow Corning Corp.

Monoalkamine esters of pyrrole-3-carboxylic acids. 2,500,713. American Cyanamid Co.

4-phenyl-1-alkyl isonipecotic acid lactones. 2,500,714. Abbott Labs.

Preparing 2-ethyldibenzofuran by reacting ethyl chloride and dibenzofuran in the presence of aluminum chloride as a catalyst. 2,500,732. General Electric Co.

Producing a vinyldibenzofuran by dehydrogenation of an ethyldibenzofuran by passing said ethyldibenzofuran downwardly through a heated column containing a dehydrogenation catalyst and condensing and isolating the vinyldibenzofuran issuing from the bottom of said column. 2,500,733. General Electric Co.

Preparing 2-ethyldibenzofuran by reducing an organic liquid solution of 2-acetyldibenzofuran with hydrogen in the presence of copper chromite as a catalyst. 2,500,734. General Electric Co.

Separating a diolefin from a mono-olefin by contacting the mixture with a liquid phenolic compound in the presence of an acid condensing catalyst selected from the group consisting of sulfuric acid and a sulfonic acid. 2,500,736. Standard Oil Development Co.

Preparing an organo-substituted halogenosilane by treating a liquor organopolysiloxane wherein the organic groups are connected directly to silicon atoms through C-Si linkages, the said organic groups being selected from the class consisting of alkyl, aryl, aralkyl, and alkaryl radicals, with a thionly halide in the presence of a catalyst for the reaction selected from the class consisting of hydrogen halides, halides of iron, boron, zinc and tin, and hydrates of the metal halides to obtain a reaction product containing the said organo-substituted halogenosilane. 2,500,761. General Electric Co.

Mixed fatty acid and rosin esters of resinous epoxides. 2,500,765. Devoe & Raynolds Co., Inc.

In reactivating a catalyst containing a reduced oxide of a metal selected from the group consisting of cobalt and nickel, carrying a nitrogen-containing tarry material deposited thereon during the reaction of ammonia with olefins the improvement which comprises passing hydrogen in contact with said catalyst, whereby the tarry material is converted to volatilized hydrocarbon and ammonia. 2,500,776. Sinclair Refining Co.

Composition of urea-formaldehyde and organosilicon compound. 2,500,843. ½ to Ellis-Foster Co. and ½ to Montclair Research Corp.

Aliphatic esters of 3,4-bis-(m-methyl-p-hydroxyphenyl) hexanes. 2,500,855. Reed & Carnrick.

Aliphatic esters of 3,4-bis-(m-methyl-p-hydroxyphenyl)-2,4-hexadiene. 2,500,856. Reed & Carnrick.

Alkyl benzyl sebacates. 2,500,893. Hardesty Chemical Co., Inc.

2-allyl-6-secondarybutylphenyl ester of benzoic acid. 2,500,901. Dow Chemical Co.

2-allylphenyl ester of benzoic acid. 2,500,902. Dow Chemical Co.

In a carbonylation process wherein olefins and carbon monoxide and hydrogen are contacted in a liquid phase with a carbonylation catalyst to produce oxygenated organic reaction products comprising aldehydes containing one more carbon atom per molecule than said olefins and wherein the products from said initial stage are subsequently hydrogenated in a second stage to form alcohols, the improvement which comprises employing as a carbonylation catalyst a silica hydrogel impregnated with cobalt, thoria and copper. 2,500,913. Standard Oil Development Co.

Acylation of hydroxylated esters. 2,500,918. B. F. Goodrich Co.

Ethers of beta-hydroxyadiponitrile. 2,500,942. E. I. du Pont de Nemours & Co.

Making cyanogen bromide by slowly reacting sodium cyanide with bromine water in the presence of sulphuric acid. 2,500,946. Koppers Co., Inc.

Treating raw alcoholic liquors containing higher alcohols which comprises subjecting the liquor repeatedly to cracking by admixture with compressed air and explosive release into a confined space, and then to the influence of heat and to pressure above atmospheric and mingling the liquor with air prior and subsequent to cracking to separate the deleterious components. 2,500,951. Disticraft, Inc.

Epoxides and process of preparing same. 2,501,026. William R. Warner & Co., Inc.

Catalytic vapor phase dehydration of 1,2-propylene glycol to propionaldehyde over a dehydration catalyst comprising a mixture of mono-sodium phosphate and silicon dioxide. 2,501,042. Celanese Corp. of America.

Oxidizing an aromatic hydrocarbon of at least 7 carbon atoms per molecule by reacting with an oxygen-containing gas in the presence of a nitroalkane. 2,501,088. Universal Oil Products Co.

Basic zinc salicylate, $Zn_5C_{14}H_{10}O_7.3H_2O$. 2,501,127. National Lead Co.

Nitro-thiophanthraquinones. 2,501,131. E. I. du Pont de Nemours & Co.

Mono-amino-thiophanthraquinones. 2,501,132. E. I. du Pont de Nemours & Co.

Producing an alkenyl-substituted unsaturated aldehyde by heating an acetal. 2,501,144. Hercules Powder Co.

Preparing substituted pteridines by reacting 2,4,5-triamino-6-hydroxy pyrimidine, an alpha-halo-beta-alkoxy propionaldehyde and an amino acid amide of aminobenzoic acid. 2,501,168. American Cyanamid Co.

2-(2′-methyl-4′-amino-5′-methoxy-phenyl)-2,1,3 benzotriazole. 2,501,188. American Cyanamid Co.

2-p-menthyl carbinyl acetate. 2,501,199. Food Machinery and Chemical Corp.

Production of menthane aldehyde by reacting with hydrogen a member selected from the class consisting of limonene and dipentene in the presence of a hydrogenation catalyst until the side chain double bond is saturated, then introducing carbon monoxide into the reaction chamber and subjecting the reaction mixture to elevated temperature and pressure until an aldehyde group is substituted on the 2-position of said reactant. 2,501,200. Food Machinery and Chemical Corp.

N-phenyl-3,5-diethyl-2-propyl-pyridinium compounds. 2,501,209. B. F. Goodrich Co.

Beta-thioether of adiponitrile. 2,501,226. E. I. du Pont de Nemours & Co.

Introducing butadiene dimer and chlorine to a chlorination zone, to form vinyl dichlorocyclohexene-3, passing directly into a dehydrogenation zone and there contacting an active dehydrogenation catalyst to accomplish removal of hydrogen from the ring and conversion of said ring to a benzene ring, and separating from the dehydrogenation effluent a fraction comprising dichlorostyrene. 2,501,382. Phillips Petroleum Co.

Separating mono-hydroxy alkyl phenols from cashew nut shell liquid by contacting with an inert solvent. 2,501,451. M. W. Kellogg Co.

Preparing 3,6-bis(S-(γ-amino, γ-carboxypropyl)-ethyl-2,-5-diketopiperazine by condensing homocysteine with 3,6-bis(β chloroethyl)-2,5-diketopiperazine. 2,501,455. Lankenau Hospital.

Preparation of amines by heating an ammonia-type compound of the class consisting of ammonia, primary amines, and secondary amines with a hydrocarbon olefinic compound under the influence of an alkali metal catalyst in the presence of an organic liquid diluent for the olefinic reactant. 2,501,509. E. I. du Pont de Nemours & Co.

3-cycloheptenyl-3-ethyl barbituric acid and salts thereof. 2,501,551. William Taub.

In obtaining an amine, the step of heating a basic amonnia-type compound of the group consisting of ammonia and amines with an acyclic hydrocarbon containing not more than 6 carbon atoms and, as the sole unsaturation, a double bond between the carbon atoms in the 1,2-positions, said heating being effected under substantially anhydrous conditions in the presence, as catalyst, of a member of the group consisting of alkali metal hydrides and elementary alkali metals. 2,501,556. E. I. du Pont de Nemours & Co.

Preparation of a saturated monohalide by reacting a dihalogenated saturated hydrocarbon and an isoparaffin in the presence of a catalyst of the Friedel-Crafts type to effect the transfer of a halogen atom. 2,501,597. Shell Development Co.

1-(beta-dimethylaminoethyl)-benzotriazole and acid addition and quaternary ammonium salts thereof. 2,501,649. Upjohn Co.

Paper & Pulp

Coated paper having the printing qualities of casein coated paper carrying a coating deposited from an aqueous composition comprising mineral pigment and an adhesive comprising oxidized cellulose dissolved in alkali, said oxidized cellulose being prepared by treating cellulose with nitrogen peroxide. 2,498,207. Champion Paper & Fibre Co.

Paper coating composition comprising water, water-dispersible adhesive, and a clay product which has been produced by dewatering by evaporation to non-fluid condition an aqueous suspension of clay deflocculated with a soluble polyphosphate. 2,500,972. S. D. Warren Co.

Petroleum

Mineral lubricating oil containing a thenylamine selected from the group consisting of 2-thenylamine and di-2-thenylamine to reduce corrosion. 2,497,067. Socony-Vacuum Oil Co., Inc.

Lubricant composition comprising a mineral lubricating oil and a minor amount, sufficient to confer detergent properties on the composition, of a substantially neutral polyvalent metal salt. 2,497,099. Gulf Oil Corp.

Apparatus for pyrolytic conversion of hydrocarbons. 2,497,106. Sinclair Refining Co.

Polymerizing conjugated dienes in the presence of selected alkyl esters of mercaptyl undecanoic acids as polymerization regulators. 2,497,107. Armstrong Cork Co.

Lubricating composition comprising a mineral lubricating oil base and an oxidation inhibiting amount of a compound. 2,497,132. Standard Oil Development Co.

Preparing a lubricating grease which comprises combining lithium stearate, zinc naphthenate, di-2-ethyl hexyl sebacate, and antioxidant. 2,497,133. Standard Oil Development Co.

Purifying oil soluble petroleum sulfonates dissolved in an aqueous solution of a C_2 to C_4 monohydric alcohol containing alcohol by treating with an aqueous solution of sodium sulfate. 2,497,152. Standard Oil Development Co.

Hydrogenation of unsaturated high molecular weight petroleum hydrocarbons containing sulfur with a catalyst consisting of nickel sulfide promoted with thoria, the balance of the catalyst being alumina. 2,497,176. Standard Oil Development Co.

Hydrocarbon oil and an amine salt of an acid compound of boric acid and a member selected from the group consisting of glycols and polyhydroxy benzenes. 2,497,521. Gulf Research & Development Co.

Synthesis of normally liquid hydrocarbons by the interaction of hydrogen and carbon monoxide, in the presence of a sintered iron synthesis catalyst. 2,497,761. Phillips Petroleum Co.

Hydrocarbon synthesis from oxides of carbon and hydrogen by contacting feed gases with an iron catalyst. 2,497,932. Standard Oil Development Co.

Synthesis of hydrocarbons by the interaction of carbon monoxide and hydrogen in the presence of a fluidized finely divided iron type catalyst. 2,497,964. Standard Oil Development Co.

Removing oxygenated organic compounds from a hydrocarbon fraction containing them by contact with a treating reagent comprising a hydrocarbon fraction, an alkali metal sulfonate and an alkali metal hydroxide 2,497,967. Standard Oil Development Co.

Conversion of hydrocarbons with suspended catalyst. 2,498,088. Standard Oil Development Co.

Removing methane and ethane from a rich absorption oil containing methane, ethane and heavier hydrocarbons in tower structure containing an absorption section, an intermediate heat exchange section and a stripping section. 2,498,177. Refinery Maintenance Co., Inc.

Producing substantially moisture-free, odorless refined petroleum oils and waxes by maintaining a moisture containing refined petroleum product in a liquid condition, blowing said product with air and introducing gaseous sulfur dioxide sufficient to remove the rancid odor. 2,498,201. Socony-Vacuum Oil Co., Inc.

Desulfurization and conversion of a naphtha. 2,498,559. M. W. Kellogg Co.

Activating olefin hydrocarbons in condensation reactions by passing the hydrocarbons which enter into the condensation reactions, through a granular mass consisting of an intimate mixture of catalyst granules and spacer granules, said spacer granules being in physical non-adhering contact with said catalyst granules, each of said catalyst granules comprising an intimate mixture of phosphoric acid and finely divided supporting material therefor, and each of said spacer granules being composed of charcoal. 2,498,607. Polymerization Process Corp.

Extreme pressure lubricant consisting of mineral base lubricating oil and an extreme pressure additive, consisting of a sulfurized and phosphorized fatty material and a composition selected from the group consisting of tricresyl phosphite and tricresyl phosphate. 2,498,628. Standard Oil Development Co.

In refining petroleum utilizing sulfuric acid, the improvement which comprises carrying out the said process with a composition of sulfuric acid to which has been added hydrogen fluoride. 2,498,629. Standard Oil Development Co.

Gasoline containing an oxidation inhibitor prepared by the reductive alkylation of p phenylene diamine with a mixture of methyl-ethyl-ketone and acetone. 2,498,630. Universal Oil Products Co.

Breaking petroleum emulsions of the water-in-oil type, by the action of a demulsifier including a drastically-oxidized, hydrophile, oxyakylated 2,4,6 C_4 to C_8 hydrocarbon substituted monocyclic phenol-C_1 to C_8 aldehyde resin. 2,498,656. Petrolite Corp., Ltd.

Breaking petroleum emulsions of the water-in-oil-type, by action of a demulsifier including a water-miscible oxyethylated ricinoleic acid-polycarboxy acid-glycerol ester. 2,498,657. Petrolite Corp. Ltd.

Breaking petroleum emulsions of the water-in-oil type, by action of a demulsifier including a water-miscible oxyethylated triricinolein acidic ester. 2,498,658. Petrolite Corp., Ltd.

Alkylation of an alkylatable hydrocarbon in the presence of hydrogen fluoride contacting liquid bottom fraction of hydrogen fluoride and water with a liquid cycloolefin under conditions such that said hydrogen fluoride is bound as an organic fluoride. 2,498,789. Phillips Petroleum Co.

Synthesis of hydrocarbons from carbon oxides and hydrogen, by passing through dense turbulent mass of finely divided fluidized synthesis catalyst. 2,498,838. Standard Oil Development Co.

In cracking higher boiling hydrocarbons by passing them upwardly through a mass of solid contact particles, the step which comprises injecting a normally liquid isobutylene polymer into the reactor to crack said polymer principally to isobutylene. 2,498,840. Standard Oil Development Co.

Hydrocarbon synthesis reaction by treating a finely divided fluidized iron type catalyst with hydrogen, then treating with methane gas in the absence of oxide of carbon, then contacting said catalyst with synthesis gases in gradually increasing amounts together with methane until the synthesis gases represent 100% of the fresh feed. 2,498,845. Standard Oil Development Co.

Mineral oil composition comprising a hydrocarbon fraction and a com-

pound represented by the general formula: R'-A-R^2-B-R^3 where R' and R^2 are tertiary lower alkyl groups; R^2 is a divalent lower alkyl group; A is a trithiocarbonate group and B is a trithiocarbonate group. 2,498,863. Socony-Vacuum Oil Co., Inc.

Cracking hydrocarbon liquid to hydrocarbons within the gasoline boiling range comprising subjecting said liquid to cracking conditions in the presence of bromocyclohexane. 2,498,883. Pure Oil Co.

Mineral oil containing an oil soluble condensation product. 2,498,961. Socony-Vacuum Oil Co., Inc.

Catalytic conversion of hydrocarbons by subjecting said hydrocarbons to a temperature in the presence of a catalyst comprising a carrier and a molybdenum oxide-containing catalytic agent. 2,499,255. Union Oil Co. of Calif.

Method and apparatus for hydrocarbon conversion. 2,499,304. Socony-Vacuum Oil Co., Inc.

Breaking petroleum emulsions of the water-in-oil type by a demulsifier including a hydrophile oxyalkylated synthetic resin; said synthetic resin being one in which the ratio of oxyalkylene groups to structural units is at least .2 to 1 and the alkylene radicals of the oxyalkylene groups are selected from the group consisting of ethylene, propylene, butylene, hydroxy propylene and hydroxy butylene radicals. 2,499,365. Petrolite Corp., Ltd.

Breaking petroleum emulsions of the water-in-oil type by a demulsifier including a hydrophile oxyalkylated phenolic resin; said phenolic resin being one in which a phenol supplies a resinogen radical; said resin being one in which the ratio of oxyalkylene groups to phenolic nuclei is at least 2:1 and the alkylene radicals of the oxyalkylene groups are selected from the group consisting of ethylene, propylene, butylene, hydroxy propylene and hydroxy butylene radicals. 2,499,366. Petrolite Corp, Ltd.

Breaking petroleum emulsions of the water-in-oil type by action of a demulsifier including a hydrophile oxyalkylated 2,4,6 substituted monocyclic phenol C_1- to C_8- aldehyde resin. 2,499,367. Petrolite Corp., Ltd.

Breaking petroleum emulsions of the water-in-oil type by action of a demulsifier including a hydrophile oxyalkylated 2,4,6 C_1- to C_{24}- hydrocarbon susbstituted monocyclic phenol- C_1- to C_8 aldehyde resin. 2,499,368. Petrolite Corp., Ltd.

Breaking petroleum emulsions of the water-in-oil type, by action of a demulsifier including hydrophile synthetic products; said hydrophile synthetic products being oxyalkylation products of an alpha-beta alkylene oxide having not more than 4 carbon atoms and selected from the class consisting of ethylene oxide, propylene oxide, butylene oxide, glycide and methylglycide; and an oxyalkylation-susceptible, fusible, organic solvent-soluble, water-insoluble, resinous polymer, obtained by the polymerization of an acrylate or vinyl ester monomer. 2,499,369. Petrolite Corp., Ltd.

Breaking petroleum emulsions of the water-in-oil type by action of a demulsifier including a hydrophile oxyalkylated 2,4,6 C_4- to C_{24}- hydrocarbon substituted monocyclic phenol-C_1 to C_8 aldehyde resin. 2,499,370. Petrolite Corp., Ltd.

Producing substantially liquid hydrocarbons by the hydrogenation of carbon monoxide comprising passing a synthesis gas under a pressure of 10 to 30 atmospheres into contact with a sintered iron catalyst. 2,499,372. Koppers Co., Inc.

Water base drilling mud which forms a filter cake on the wall of the well, improved by incorporating a water soluble cellulose selected from the group consisting of aminocellulose and the salts formed by the addition reactions between aminocellulose and strong mineral acids. 2,499,548. Phillips Petroleum Co.

Anticorrosive lubricating oil consisting of a lubricating oil and soaps selected from the class consisting of the alkali and alkaline earth metal soaps of petroleum sulfonic acids. 2,499,710. Union Oil Co. of Calif.

Contacting thiourea with a mixture of hydrocarbons containing at least one hydrocarbon of the group consisting of isoparaffins, naphthenes, isoolefins, cycloolefins and alkylated aromatic hydrocarbons having at least one isoparaffin radical of at least 6 carbon atoms, whereby crystalline complexes are formed between thiourea and hydrocarbons from said group. 2,499,820. Shell Development Co.

Catalytic conversion of hydrocarbons in the presence of a catalyst comprising an oxide of a heavy metal of atomic No. 22 to 42, and bauxite containing oxides of iron, silicon, titanium and sodium. 2,500,146. Union Oil Co. of Calif.

Synthetic lubricants by thermally and non-catalytically heating a charge consisting of a normal, alpha monoolefin having between about 6 and about 14 carbon atoms per molecule in the presence of a gas selected from the group consisting of hydrogen, carbon monoxide, and mixtures of hydrogen and carbon monoxide. 2,500,159. Socony-Vacuum Oil Co., Inc.

Synthetic lubricants by heating a straight chain normal, alpha monoolefin having between 5 and about 12 carbon atoms and styrene. 2,500,160. Socony-Vacuum Oil Co., Inc.

Converting a normal, alpha mono-olefin having from 6 to about 12 carbon atoms, to a viscous oil by heating with lead tetra-acetate. 2,500,161. Socony-Vacuum Oil Co., Inc.

Preparing a viscous oil from a short chain mono-olefin having from 2 to 6 carbon atoms per molecule and a long-chain normal, alpha, mono-olefin having from 10 to 30 carbon atoms per molecule. 2,500,162. Socony-Vacuum Oil Co., Inc.

Synthetic lubricants by polymerizing a normal, alpha mono-olefin having from 5 to 18 carbon atoms with a material selected from the group consisting of a phosphorus sulfide, elemental phosphorus with elemental sulfur, and mixtures thereof. 2,500,163. Socony-Vacuum Oil Co., Inc.

Synthetic lubricant by polymerizing a normal, alpha mono-olefin having from about 6 to 14 carbon atoms, in the presence of an elemental substance selected from the group consisting of sulfur, selenium and tellurium. 2,500,164. Socony-Vacuum Oil Co., Inc.

Synthetic lubricants from a normal, alpha mono-olefin having from about 6 to about 14 carbon atoms per molecule by heating. 2,500,165. Socony-Vacuum Oil Co., Inc.

Synthetic lubricants from a normal, alpha mono-olefin having between 6 and about 12 carbon atoms per molecule by heating. 2,500,166. Socony-Vacuum Oil Co., Inc.

Lubricant composition by condensing a straight chain, alpha mono-olefin having from 5 to 18 carbon atoms per molecule, a conjugated hydrocarbon and a substance selected from the group consisting of sulfur, selenium and tellurium. 2,500,167. Socony-Vacuum Oil Co., Inc.

Hydrocarbon conversion process with an active catalyst by precipitating sodium silicate containing silicic acid diluted with water with a solution of ammonium chloride, adding a solution of aluminum nitrate ($9H_2O$) and water and concentrated ammonia water until the reaction is alkaline, then boiling, filtering the precipitate, washing and drying thereby producing an active catalyst. 2,500,197. Attorney General of the U. S.

Synthetic lubricants by heating a mono-olefin having between about 8

and about 18 carbon atoms per molecule and a vinyl aromatic compound, in the presence of a catalyst comprising an association of silica and an amphoteric metal oxide. 2,500,203. Socony-Vacuum Oil Co., Inc.

Preparing a viscous oil from a normal, alpha mono-olefin having from about 6 to 14 carbon atoms per molecule in the presence of a cyclic hydrocarbon. 2,500,244. Socony-Vacuum Oil Co., Inc.

Synthetic lubricants by condensing a straight chain, alpha mono-olefin having from 6 to 14 carbon atoms, a conjugated hydrocarbon and a material selected from the group consisting of a phosphorus sulfide, elemental phosphorus with elemental sulfur. 2,500,247. Socony-Vacuum Oil Co., Inc.

Breaking petroleum emulsions of the water-in-oil type, by the action of a demulsifier including a hydrophile hydroxy-polyalkoxy compound obtained by the action of an alkylene oxide containing a reactive ethlene oxide ring and having not over 4 carbon atoms, on a stearic acid partial ester of a polyhydric alcohol, selected from the group consisting of pentaerythritol, polypentaerythritols, and mixtures thereof. 2,500,349. Petrolite Corp., Ltd.

In dehydrogenation of a saturated hydrocarbon with a chromium oxide catalyst in the absence of added hydrogen wherein the catalyst is periodically regenerated by burning carbonaceous deposits therefrom the improvement which comprises saturating the catalyst with substantially dry carbon monoxide after regeneration prior to contacting it with the material to be dehydrogenated. 2,500,482. Shell Development Co.

Mineral oil composition comprising a viscous mineral oil fraction, an alkyl phenyl phosphite and a lower alkyl-substituted thiophene. 2,500,-498. Socony-Vacuum Oil Co., Inc.

Hydrocarbon synthesis. 2,500,516. Standard Oil Co.

Synthesis of hydrocarbons by the reaction of hydrogen and carbon monoxide. 2,500,519. Phillips Petroleum Co.

Production of wax in high yields by reacting a gaseous mixture containing carbon monoxide and hydrogen and containing about 50% nitrogen by volume in the presence of a cobalt synthesis catalyst and treating the effluents to recover a high yield of wax. 2,500,533. Phillips Petroleum Co.

Preparation of a viscous oil by condensing a normal, alpha mono-olefin having from 5 to 18 carbon atoms per molecule, a conjugated olefinic hydrocarbon and a thiol. 2,500,672. Socony-Vacuum Oil Co., Inc.

Catalytic conversion of hydrocarbons. 2,500,737. Sinclair Refining Co.

Removal of asphaltic constituents from hydrocarbon oil by treatment with a liquefied normally gaseous petroleum C3 and higher hydrocarbon solvent. 2,500,757. Texaco Development Corp.

Lubricant consisting of a waxy mineral lubricating oil, containing pour-depressing amount of a condensation product of amyl naphthalene and phosphorus trichloride. 2,500,762. Standard Oil Development Co.

Hydrocarbon cracking process and apparatus using pebble heater with jet ejector. 2,500,870. Phillips Petroleum Co.

Dehydrogenation of an aliphatic paraffin hydrocarbon containing 4 to 5 carbon atoms by contacting said hydrocarbon diluted with steam with a catalyst consisting of aluminum oxide and one oxide selected from the group consisting of molybdenum oxide, tungsten oxide and vanadium oxide, and an activator comprising chromium oxide. 2,500,920. Phillips Petroleum Co.

Process for breaking petroleum emulsions of the water-in-oil type, characterized by subjecting the emulsion to the action of a mixture containing oxyalkylation products of an alpha-beta alkylene oxide having not more than 4 carbon atoms; and an oxyalkylation-susceptible, fusible, organic solvent-soluble, water-insoluble phenol-aldehyde resin alkyl naphthalene sulfonate; and oil-soluble alkali metal salt of mahogany petroleum acid. 2,501,015. Petrolite Corp., Ltd.

Hydrocarbon conversion with hydrogen fluoride in homogeneous phase. 2,501,023. Pan American Refining Corp.

Regenerating aromatic hydrocarbons from a solution of aromatic hydrocarbons and sulfur compounds in liquid HF-BF_3, by subjecting said solution to a dissociative distillation, separating a distillate comprising HF and BF_3, separating a distillation residue comprising free aromatic hydrocarbon and HF-BF_3 co-ordination compounds of organic sulfur compounds, subjecting said residue to gravity separation, and recovering an aromatic hydrocarbon fraction and a fraction comprising co-ordination compounds of organic sulfur compounds. 2,501,064. Standard Oil Co.

Isomerization of hydrocarbons with a bed of solid anhydrous sludge-forming metal halide catalyst of the Friedel-Crafts type. 2,501,071. Universal Oil Products Co.

Separation of hydrocarbon synthesis products obtained in the catalytic hydrogenation of carbon monoxide. 2,501,115. Standard Oil Co.

Jet combustion fuel comprising a distillate hydrocarbon petroleum oil and thiophene. 2,501,124. Socony-Vacuum Oil Co., Inc.

Making bituminous compositions by heating gilsonite, incorporating in the molten material a microcrystalline wax, allowing the resulting mixture to cool and then incorporating in the resulting mixture, a predetermined quantity of paraffin. 2,501,149. Western Electric Co., Inc.

Manufacturing an improved synthetic gasoline from a raw Fischer-Tropsch type gasoline, by passing it through a first contact zone in the absence of steam in contact with a cracking catalyst for removing oxygenated materials and isomerizing hydrocarbons, and passing effluents through a second contact zone in contact with a cracking catalyst to further isomerize said hydrocarbons. 2,501,223. Phillips Petroleum Co.

Treating highly aromatic petroleum stock to provide a light colored stock by reacting with formaldehyde and ammonium chloride, water washing and separating the water washed reaction mixture. 2,501,602. Socony-Vacuum Oil Co., Inc.

Methylating isoparaffins predominantly at the terminal carbon atoms by reacting a methyl halide with an isoparaffin in the presence of a catalyst consisting essentially of hydrogen fluoride. 2,501,625. Socony-Vacuum Oil Co., Inc.

Photographic

Obtaining direct positive image in a silver halide emulsion layer by exposing a test portion and development in the internal type developer: hydroquinone, monomethyl-p-aminophenol sulfate, anhydrous sodium sulfite, potassium bromide, sodium hydroxide, and sodium thiosulfate gives a maximum density at least 5 times the maximum density obtained when the equally exposed silver halide emulsion is developed in the following surface developer (D): p-hydroxyphenylglycine, sodium carbonate, and water and developing only the unexposed portion in an aerial fogging developer with access of oxygen. 2,497,875. Eastman Kodak Co.

Obtaining a direct positive image in a silver halide emulsion layer, by exposing a silver halide emulsion layer containing an acid dye, a test portion and development in the following internal type developer: hydroquinone, monomethyl-p-aminophenol sulfate, sodium sulfite (anhydrous), potassium bromide, sodium hydroxide, sodium thiosulfate (crystals), and water gives a maximum density at least 5 times the maximum density obtained in the following surface developer: p-hydroxyphenylglycine, sodium carbonate (crystals), and water. 2,497,876. Eastman Kodak Co.

Obtaining a direct positive image in a silver halide emulsion layer. 2,497,917. Eastman Kodak Co.

Production of azo dyestuff images from N-acyl-N-aryl hydrazine developers. 2,498,418. General Aniline & Film Corp.

Phenolic color formers. 2,498,466. General Aniline & Film Corp.

Dianil dye photographic filter layer. 2,500,045. Eastman Kodak Co.

Change of shade of diazotype images by treatment with moist sulfur dioxide vapors. 2,500,096. General Aniline & Film Corp.

Diazo sulfonate light-sensitive element containing a diketone azo component. 2,500,099. General Aniline & Film Corp.

Photographic silver-halide emulsions containing trinuclear cyanine dyes. 2,500,112. General Aniline & Film Corp.

Yellow diffusion-fast color formers of the benzimidazole class. 2,500,487. General Aniline & Film Corp.

Polymers

Reaction products of dicyandiamide with an amine-formaldehyde **reaction product.** 2,497,073. American Cyanamid Co.

Resinous composition comprising a urea-formaldehyde resin chemically combined under heat with a water-soluble product of reaction of dicyandiamide with the water-soluble product of reaction of formaldehyde and an amine selected from the class consisting of primary aromatic hydrocarbon monoamines and secondary hydrocarbon monoamines. 2,497,074. American Cyanamid Co.

Polymeric sulfurous acid esters. 2,497,135. Celanese Corp. of America.

Solutions of acetone insoluble polymers prepared from styrene in carbon disulphide with acetone. 2,497,259. Societe "Rhodiaceta."

Solid ethylene/vinyl chloride polymer. 2,497,291. E. I. du Pont de Nemours & Co.

Preparation of solid polymers from glycols and 1,3-dioxolane. 2,497,315. E. I. du Pont de Nemours & Co.

Polymerizing ethylene by heating in the presence of a tertiary alkyl percarboxylate. 2,497,323. E. I. du Pont de Nemours & Co.

Silica sol catalyst in the emulsion polymerization of butadiene-1,3-hydrocarbons. 2,497,447. U. S. Rubber Co.

Preparation of prostheses from methyl methacrylate monomer and polymer. 2,497,451. Max Haefeli.

Laminates and polymers of alkenyl esters of arylphosphonic acids. 2,497,-637. Victor Chemical Works.

Copolymers of alkeynl diesters of alkenylphosphonic acids with methyl methacrylate. 2,497,638. Victor Chemical Works.

Copolymerization product of a N-vinyl lactam and a polymerizable ester of a monocarboxylic acid. 2,497,705. E. I. du Pont de Nemours & Co.

Polymerizing vinyl acetate in aqueous emulsion in the presence of hydrogen peroxide as catalyst and formaldehyde sulfoxylate as activator. 2,497,828. E. I. du Pont de Nemours & Co.

Polmerizing butadiene in the presence of tetra-aryl succino di-nitrile. 2,497,833. Publicker Industries, Inc.

Resins from esters of 1-hydroxy-butadiene-1,3 insolubilized with nitrogen bases. 2,497,926. Rohm & Haas Co.

Preparing resinous materials by condensing glycerol, decamethylene diamine, and 2-(beta-carboxyethyl)-2-ethylhexaldehyde. 2,497,955. Rohm & Haas Co.

Reacting pure methyl dilinoleate with decamethylene glycol in the presence of zinc dilinoleate to produce a high molecular weight polyester. 2,497,968. Standard Oil Development Co.

Soluble unsaturated binary copolymer of a di-2-alkenyl fumarate selected from the class consisting of diallyl fumarate, dimethallyl fumarate, and di(2-chloroallyl) fumarate and a chlorinated-alkene having from 3 to 4 carbon atoms. 2,498,064. U. S. Rubber Co.

Interpolymers of styrene, fumaric esters, and chlorinated alkenes. 2,498,-099. U. S. Rubber Co.

Amino alkyleneoxide polymerization product. 2,498,195. Shell Development Co.

Polymerization of compounds containing a terminal methylene group by heating in the presence of: (a) a sulphur compound selected from the group consisting of sulphites and free sulphur dioxide; (b) oxygen to oxidize the sulphur compound; and (c) a salt selected from the class of metal salts that catalyse sulphite oxidation. 2,498,226. A. Boake Roberts and Co., Ltd.

Polyvinyl chloride compositions containing sulfuric acid treated high-boiling petroleum extract. 2,498,453. Shell Development Co.

Hardenable emulsion serving as binding agent for the fixation of finely dispersed pigments on fibrous materials, the aqueous external phase consisting of a solution containing acid casein brought into solution by an alkaline substance and a water-soluble ether of a substantially ilimitedly water-miscible aliphatic alcohol with a methylol compound of a substance selected from the group consisting of urea, thiourea, guanidine, dicyandiamide and melamine, and the oily internal phase of the said emulsion consisting of an organic liquid which is only partially miscible with water. 2,498,454. Ciba, Ltd.

Polymeric monovinyldibenzofuran. 2,498,474. General Electric Co.

Resinous composition comprising the condensation product of a linear condensation polymer formed by the reaction of a cyclohexadiene dicarboxylic acid and a member of the group consisting of the dihydric alcohols, the diamines and the amino-alcohols and a linear condensation polymer formed by the reaction of an alpha, beta, ethylenically unsaturated aliphatic dicarboxylic acid and a member of the group consisting of the dihydric alcohols, the diamines and the amino-alcohols. 2,498,533. California Research Corp.

Daylight fluorescent sheeting comprising a transparent sheet of thermoplastic resinous material, at least one solvated dye exhibiting a subtractive color and fluorescing in response to daylight when in dilute solution, and pigmenting particles of a transparent thermoset resinous carrier in which said dye is maintained in a solvated state. 2,498,593. Robert C. Switzer and Joseph L. Switzer.

Plasticized vinyl resin composition which comprises a vinyl chloride polymer containing an ester. 2,498,602. Monsanto Chemical Co.

Forming a resinous product by heating styrene and a compound having the structural formula: ROOC (CN) C=CH—C_6H_6—R', wherein R is an alkyl group having from one to 5 carbon atoms, and R' is a radical of the group consisting of hydrogen and alkoxy having from one to four carbon atoms. 2,498,616. Monsanto Chemical Co.

Polyglycol products. 2,498,617. Monsanto Chemical Co.

Polyglycol sulfate salts of diamino-diphenyl sulfone. 2,498,618. Monsanto Chemical Co.

Polyglycolsulfonic acid salts of diaminodiphenyl sulfone. 2,498,619. Monsanto Chemical Co.

Expanded, porous, low-density, cellular, cured water-insoluble resin obtained by subjecting a homogeneous mixture including a polymerizable unsaturated alkyd resin, a compatible copolymerizable liquid and a vinyl group, being selected from the group consisting of styrene, alkyl-substituted styrenes and chlorinated styrenes, cellulose acetobutyrate, and a solid, gas-liberating material. 2,498,621. American Cyanamid Co.

Cork composition comprising a binder of the group consisting of resinous binders and proteinaceous binders, and a paraffin solution containing a rubber-like copolymer of an open chain aliphatic conjugated diolefin and alpha-methyl-para-methyl-styrene. 2,498,638. Armstrong Cork Co.

Producing a stable aqueous resin dispersion by polymerizing a polymerizable material of the group consisting of monomeric lower alkyl acrylate and a mixture consisting of monomeric lower alkyl acrylate and acrylonitrile, by heating in the presence of a synthetic ionic surface-active wetting and emulsifying agent therefor; a peroxide polymerizing catalyst; ammonia; and colloid consisting of ammonium alginate. 2,498,694. U. S. A. as represented by the Secretary of Agriculture.

Aqueous emulsion of polyvinyl acetate containing resin, a member selected from the class consisting of the alkaline salts of the sulphonation products of alkylated polynuclear compounds and, as protective colloid, a polypeptide. 2,498,792. Societe des Usines Chimiques Rhone-Poulenc.

Thermoreversible gels of hydrolyzed vinyl fluoride/vinyl acetate copolymers. 2,499,097. E. I. du Pont de Nemours & Co.

Polymers of 2-vinyldibenzothiophene. 2,499,187. General Electric Co.

Making a furfuryl alcohol resinous product selected from the group consisting of the initial condensation product of furfuryl alcohol and of mixtures of furfuryl alcohol and furfural. 2,499,275. Haveg Corp.

Manufacturing melamine by mixing dicyandiamide and ammonia and heating in the presence of a neutral ammonium salt of an inorganic acid. 2,499,373. Monsanto Chemical Co.

Self-sustaining film of improved clarity formed of polyethylene compounded with di-2 ethyl hexyl phthalate and carnauba wax. 2,499,486. Visking Corp.

Resinous polymer selected from the group consisting of polyvinyl chloride and copolymers of vinyl chloride and vinyl acetate, stabilized against discoloration and fabric-rotting tendencies upon exposure to light or to elevated temperatures by admixture with a penta alkali-metal penta-alkyl tripolyphosphate. 2,499,503. U. S. Rubber Co.

Lubricants containing copolymers of ethylene and vinyl acetate. 2,499,723. E. I. du Pont de Nemours & Co.

A blend of an ethylene polymer and a paraffin hydrocarbon obtained by the catalytic hydrogenation of carbon monoxide. 2,499,756. E. I. du Pont de Nemours & Co.

Producing polymeric styrene in the form of a solid light-colored rubbery resin, by first heating and partially polymerizing monomeric styrene, and then further polymerizing in the presence of an acid from the group consisting of sulfuric acid, phosphoric acid, and the aromatic sulphonic acids, and a restrainer from the group consisting of acetic acid, propionic acid, and the saturated monohydroxy aliphatic alcohols. 2,499,796. Chemical Development Corp.

Polymerization of alpha-haloacrylic compounds. 2,499,811. General Aniline & Film Corp.

Preparing high viscosity polyvinyl alcohol by hydrolyzing polyvinyl acetate by treatment with a catalytic amount of sulfuric acid while dissolved in a mixture of methanol and a hydrocarbon selected from the group consisting of benzene, toluene and xylene. 2,499,924. Shawinigan Resins Corp.

Plasticized polyamide resin which is the reaction product of a diprimary diamine and at least one which is selected from a dicarboxylic acid and amide-forming derivative of a dibasic carboxylic acid, the other reactants being selected from primary diamines different from the first and dicarboxylic acids and amide-forming derivatives of dibasic carboxylic acids different from the first selected dicarboxylic acid or amide-forming derivatives of dibasic dicarboxylic acids and a reaction with an N-alkylol aryl sulfonamide. 2,499,932. Monsanto Chemical Co.

Bland, oily product which is a condensate of a saturated, aliphatic, monocarboxylic acid of 6 to 9 carbon atoms in branched chain arrangement, R'COOH, an acyclic, saturated, non-tertiary glycol of 7 to 10 carbon atoms in branched-chain arrangement, HOR''. OH, and an acyclic, saturated, aliphatic, dicarboxylic acid of 6 to 10 carbon atoms, HOOCR-COOH, where R represents an alkylene group of 4 to 8 carbon atoms, R represents a branched-chain alkyl group of 5 to 8 carbon atoms, and R'' represents a branched alkylene group of 7 to 10 carbon atoms. 2,499,983. Rohm & Haas Co.

Bland, oily product which is a condensate of a monohydric, saturated, non-tertiary, aliphatic alcohol of 6 to 9 carbon atoms, in branched chain arrangement, an acyclic, saturated, non-tertiary glycol of 7 to 10 carbon atoms in branched chain arrangement and a dibasic acid selected from the class consisting of azelaic and sebacic acids. 2,499,984. Rohm & Haas Co.

Polymerization of substituted ethylenes containing organic coloring matter in presence of azo compounds. 2,500,023. E. I. du Pont de Nemours & Co.

Copolymerization of p-acetylamino styrene and acrylonitrile. 2,500,025. Eastman Kodak Co.

Liquid urea formaldehyde adhesive compositions. 2,500,054. British Resin Products, Ltd.

Reacting a substantially linear styrene-isobutylene copolymer with stearyl chloride in the presence of aluminum chloride as catalyst and in the presence of an inert non-aqueous solvent, hydrolyzing and removing residual catalyst and subjecting the reaction products to distillation to obtain the desired stearyl styrene-isobutylene copolymer. 2,500,082. Standard Oil Development Co.

Preparing a molding composition by contacting aqueous formaldehyde with a silvered ion exchange resin until said formaldehyde contains silver which is in a germicidally active state and condensing the silvered aqueous formaldehyde with a compound capable of forming therewith a moldable thermosetting condensation product selected from the group consisting of amino compounds, amido compounds and phenol. 2,500,113. American Cyanamid Co.

Copolymer of a mixture of 1-acetoxy-2-chlorobutadiene-1,3 and acrylonitrile. 2,500,121. Eastman Kodak Co.

Resinous starching composition comprising water; polyvinyl alcohol; sodium carboxymethylcellulose; and a water emulsion of polyvinyl acetate. 2,500,144. John B. Beck.

Sulfonation of copolymers of mono-vinyl- and polyvinyl-aromatic compounds. 2,500, 149. Dow Chemical Co.

Vulcanized dehydrochlorinated chlorinated paraffin. 2,500,152. Samuel J. Cohen and Walter E. Scheer.

Preparing a curable alkyd resin by heating a saturated polyester condensation product of a mixture composed of a saturated dicarboxylic acid of the group consisting of adipic acid, succinic acid, suberic acid, sebacic acid, methyl succinic acid, dimethyl succinic acid, and B-methyl adipic acid; a saturated dihydric alcohol of the group consisting of ethylene glycol, propylene glycol, butylene glycol, diethylene glycol, and triethylene glycol; and a modifier of the group consisting of saturated monocarboxylic acids and saturated monohydric alcohols. 2,500,222. Armstrong Cork Co.

Polymeric 2,2,4-trimethyl-tetra-hydro-quinoline as stabilizer for diene polymers. 2,500,229. Dow Chemical Co.

Polymerization of unsaturated esters of acrylic and methacrylic acids with a catalyst selected from the class consisting of alkali metal, alkali metal alkyds, and alkali metal hydrides the alkali-metal being selected from the class consisting of sodium and potassium. 2,500,265. U. S. Rubber Co.

Converting propylene to a mixture of polymeric olefins by contacting propylene with an acid polymerization catalyst. 2,500,307. California Research Corp.

Production of linear polyamides by heating until a polymer is produced from a substance selected from the group consisting of β-primary amino carboxylic acids in which the α-carbon atom is completely substituted by non-reactive groups and amide-forming derivatives of such acids and the β-amino group is the sole reactive β-substituent. 2,500,317. Celanese Corp. of America.

Heating a non-aqueous liquid consisting of ethylene glycol, incorporating urea, and incorporating casein, adding a slurry of paraformaldehyde and ethylene glycol, cooling, grinding with acetone, filtering, washing with acetone, and drying. 2,500,453. Harris-Seybold Co.

Manufacturing melamine by adding activated carbon to a mixture of dicyandiamide and ammonia, capable of producing substantially colorless melamine aldehyde condensation product when reacted with formaldehyde. 2,500,489. Monsanto Chemical Co.

Copolymers of diallyl phthalate with allyl vinyl phthalate. 2,500.607. Shell Development Co.

Polymerization of cycle oil from high-temperature steam cracking process with an active polymerizing adsorbent. 2,500,755. Standard Oil Development Co.

Copolymerizing isobutylene and a multi-olefin having 4 to 10 carbon atoms by mixing isobutylene, the multi-olefin and a 2,4,6-trialkylated phenol and polymerizing by the application of a Friedel-Crafts catalyst dissolved in a non-complex-forming solvent. 2,500,780. Standard Oil Development Co.

Aminotriazine-organosilicon composition. 2,500,842. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

Plasticized resin composition comprising polyvinyl chloride, dicyclohexyl phthalate and di-(2-ethylhexyl) phthalate. 2,500,891. B. F. Goodrich Co.

Distillation of volatile monomeric materials from aqueous polymer dispersions while reducing foam formation by the presence of acetic acid. 2,500,894. B. F. Goodrich Co.

Composition comprising highly unsaturated, higher fatty acid and an oily, siccative polymer obtained by polymerizing a conjugated diolefin of 4 to 6 carbon atoms per molecule in the presence of the monomer of a C_8 to C_{18} tertiary aliphatic mercaptan and in the presence of a water soluble, highly unsaturated, higher fatty acid soap emulsifier. 2,500,983. Standard Oil Development Co.

Making a polysiloxane resin from a mixture of organohalogenosilanes containing methyltrichlorosilane. 2,501,525. General Electric Co.

Polymerizing styrene in the presence of a polyvinyl alcohol-alkyl aldehyde reaction product. 2,501,562. International Detrola Corp.

Producing viscous liquids and resinous solids by heating an aromatic hydrocarbon, formaldehyde and solid inorganic catalytic material having as the sole essential component one of the group consisting of acid activated clay of the montmorillonite type, fresh burnt Attalpulgus clay, aluminasilica gel catalysts. 2,501,600. Socony-Vacuum Oil Co., Inc.

Diallyl-3,5-dimethylphthalate polymer. 2,501,610. Shell Development Co.

Screen oil composition consisting of a terpene solvent and benzyl cellulose also containing a resin selected from the group consisting of the methyl, ethyl and glycerol esters of rosin acid and hydrogenated rosin acid, and copaiba balsam; and a resin selected from the group consisting of polymerized terpenes and glycerol esters of terpene acids. 2,501,646. Harshaw Chemical Co.

Producing colorless, color-stable transparent polymers from monomeric polymerizable α-halogen substituted acrylic acid compounds. 2,501,647. General Aniline & Film Corp.

Rubber

Butadiene-styrene copolymer tackified with isoolefin-diolefin-styrene copolymer. 2,497,458. Sun Oil Co.

Incorporation of clay filler into synthetic rubber. 2,497,464. U. S. Rubber Co.

Plasticized elasticated composition comprising a rubber-like elastomer selected from the group consisting of polymerized vinyl chloride and a 1,3-butadiene-acrylonitrile copolymer, and, as plasticizer and elasticator, an ester. 2,498,532. American Cyanamid Co.

In manufacture of rubber-like products, the process which comprises compounding a sulfur-sulfide gum with a dithiocarbamate and then compounding it with a copolymer of butadiene and an organic compound containing the group CH₂=CH— selected from a group consisting of isoprene, styrene and acrylonitrile. 2,498,931. Hans Paul Wagner.

Treating rubber latex skim containing ammonia, by de-ammoniating, flocculating, filtering, washing to remove non-rubber constituents and impurities therefrom and converting the washed flocculated rubber into an aqueous dispersion by means of water containing an alkaline dispersing agent. 2,499,588. Revertex, Ltd.

Adhesion of rubber to fibrous materials by applying a thiosalicylic acid compound containing a carboxyl group in ortho position to an SH group. 2,499,774. Callaway Mills Co.

Curing a sulfur vulcanizable rubbery co-polymer of butadiene-1,3 and acrylonitrile by heating the co-polymer without sulfur in the presence of an ether of a methylol compound comprising a formaldehyde addition product of an amino 1,3,5-trizine. 2,500,517. Monsanto Chemical Co.

Rubber composition containing a soapy waxy material obtained by oxidizing and polymerizing oleic acid in admixture with a sulfonated vegetable oil and an oxide of a metal of the third period of the second group of the periodic system. 2,500,858. Valley Industries, Inc.

Electrical insulating compound, which comprises a vulcanizable material of the group consisting of natural rubber, rubber-like butadiene copolymers with other monomers copolymerizable therewith, mixtures of natural rubber and such rubber-like copolymers, and rubber-like polyhaloprenes, and a bituminous composition consisting of gilsonite derivative, paraffin and microcrystalline waxes. 2,501,123. Western Electric Co., Inc.

Specialties

Alkanedione dioximes as antioxidants for preserving organic compositions. 2,497,061. Henry B. Kellog.

Controlling spontaneous foaming in a continuously reacting aqueous liquid phase system, wherein an alkyl chloride is prepared from **hydrogen** chloride and an aliphatic alcohol in the presence of a metal chloride catalyst in aqueous solution by adding lauryl sulfate. 2,497,150. Standard Oil Development Co.

Stabilized milk products a 3-(mercapto) propionic compound. 2,497,320. E. I. du Pont de Nemours & Co.

Antirusting composition of refined mineral oil and an antirusting agent, an alkyl ester of glycol polycarboxylic acid ester. 2,497,432. Monsanto Chemical Co.

Bonded heat-resistant abrasive article comprising abrasive particles bonded

to a flexible backing by a binder comprising casein and a sodium silicate cement. 2,497,469. Carborundum Co.

Carbohydrate preservative selected from the group consisting of a stabilized rosin amine and the salts thereof. 2,497,579. Hercules Powder.

Preservative for proteinate selected from the group consisting of a stabilized rosin amine and the salts thereof. 2,497,610. Hercules Powder.

Resistance composition composed of an oil modified alkyd resin derived by reacting a drying oil compound selected from the group consisting of linseed oil and linseed oil acids, phthalic anhydride, and glycerol, acetylene black and a volatile organic solvent. 2,498,238. Westinghouse Electric Corp.

Increasing resistance of a drilling fluid to the deterioration caused by drilling through beds of gypsum comprising adding sodium carboxyl methyl cellulose and sodium resinate. 2,498,301. Oil Well Chemical & Materials Co.

Zirconium compound deodorant and antiperspirant. 2,498,514. National Lead Co.

Ink for intaglio printing consisting of a natural resin soluble in hydrocarbons, and a dyestuff. 2,498,812. Ciba Ltd.

Vehicle for a printing ink, consisting of partially polymerized resin dissolved in aliphatic hydrocarbon solvent, said partially polymerized resin being made by reacting phthalic acid anhydride, vegetable oil fatty acid, and polyhydric alcohol. 2,499,004. Harvey A. Seil and Herbert Cole.

Fluid-fluid method for recovering wax from solid cachaza which comprises adjusting the water content of said solid cachaza to change said cachaza from a solid to a fluid state, treating said fluid cachaza with a water-immiscible organic solvent and separating wax-laden solvent and recovering wax. 2,499,008. Cuban-American Sugar Co. and S. C. Johnson & Son, Inc.

Rubber mold and cutting lubricant comprising a surface active wetting agent of the alcohol sulfates group, and an interceptor of the ethylene oxide polymer group, an alkaline buffer salt for controlling the corrosive condition, an indicator dye for disclosing the concentration of hydrogen ion, and water. 2,499,028. Walter G. Kunze.

Mothproofing composition containing a guanidine salt of benzoic acid dissolved in a mixture of ethyl alcohol and carbon tetrachloride. 2,499,226. American Cyanamid Co.

Treating a ferrous metal surface comprising HCl, a water-soluble organic ring nitrogen-base selected from the group consisting of acridine, pyridine, quinolines and their homologues, and phenyl hydrazine. 2,499,283. Dow Chemical Co.

Concrete or mortar mixes containing a hydraulic cement and a water soluble organic compound selected from the class consisting of $RN(CH_2COOH)n$, wherein R is hydrogen or an organic radical and the n is at least 2, and the alkaline salts thereof, and which forms soluble complex salts with ions of the elements of the alkaline earth metals. 2,499,445. Kaspar Winkler & Co.

Hydraulic pressure fluid consisting of a mixture of polymerized ethylene glycol, and polymerized propylene glycol. 2,499,551. Genesee Research Corp.

Dental impression material comprising trisodium phosphate, potassium alginate, crystalline sorbitol, calcium sulphate and starch. 2,499,676. Lloyd T. Parr and Samuel B. Rabishaw.

Agent for removal of adhesive tape consisting of di-ethyl ether of ethylene glycol, mono-butyl ether of ethylene glycol, and a wetting agent. 2,500,-107. A. S. Aloe Co.

Potentially reactive binder composition of high coking propensity consisting of pitch and blending material containing α-nitronaphthalene. 2,500,-208. Great Lakes Carbon Corp.

Hot dip coating and impregnating composition for artificial flowers, artificial fruit and the like consisting of paraffin, yellow ceresin and meta terphenyl. 2,500,426. Monsanto Chemical Co.

Hot dip coating and impregnating composition for artificial flowers, artificial fruit and the like consisting of N-ortho xenyl stearamide a microcrystalline petrolatum blend and hydrogenated rosin. 2,500,427. Monsanto Chemical Co.

Antioxidant composition comprising a solution of an antioxidant acid ester selected from the group consisting of esters of ascorbic and gallic acid, which ester is soluble in propylene glycol. 2,500,543. Griffith Labs., Inc.

Carroting solution comprising an active ingredient nitrohydroxy derivative selected from the group consisting of 2-nitro-2-methyl-1-propanol, 2-nitro-2-methyl-1,3 propanediol, 2-nitro-2-ethyl-1,3 propanediol, and Tris (hydroxymethyl) nitromethane, and volatile acid selected from the group consisting of nitric, hydrochloric, acetic and formic acid. 2,500,678. Kenneth J. Hassan.

Hygroscopic water-soluble solid body having incorporated on the surface thereof, a thin coating of a vaporizable organo-silicon halide. 2,500,770. Standard Oil Development Co.

Wire drawing lubricant comprising a dry mixture of ferrous sulphate having water of crystallization and an anhydrous water soluble soap. 2,500,-810. American Steel and Wire Co. of New Jersey.

Drying wood by impregnating the wood with a material that generates a gas within the cellular structure of the wood at the temperature of the subsequent drying operation, the material impregnated into the wood being sodium bicarbonate and urea, and then subjecting the wood to kiln-drying. 2,500,954. U.S.A. as represented by the Secretary of Agriculture.

Composition for release of oxygen containing in cream form, a perborate, a polyethylene glycol, and an inactivating agent selected from the group consisting of benzaldehyde, oxyderivatives thereof and cinnamic aldehyde. 2,501,145. Nathan Smith.

Textiles

Composite products of rubber and rayon formed from rayon containing the resin product of the reaction of formaldehyde and a phenol. 2,497,-454. Dunlop Tire & Rubber Corp.

In conditioning textile filaments of synthetic, organic, filament-forming material wherein the freshly formed filament is dressed with an oil-containing, aqueous finish composition, the improvement which comprises incorporating in said finish composition polyvinyl alcohol. 2,497,536. E. I. du Pont de Nemours & Co.

Antistatic textile materials containing a textile lubricating oil and a dialkyl acid o-phosphate. 2,498,408. General Aniline & Film Corp.

Synthetic fiber preparation from an anhydride of the group consisting of maleic anhydride and succinic anhydride, and a polymer of at least 70% of acrylonitrile. 2,498,605. Monsanto Chemical Co.

Textile fabric made of heat treated oriented synthetic textile yarn of filaments formed from a copolymer of a vinyl halide with acrylonitrile. 2,499,472. Union Carbide and Carbon Corp.

Treating protein-containing textile material to reduce the felting and shrinking tendencies with a reactive product of polymerization of a polymerizable mixture including a maleic anhydride and a lower alkyl ester of acrylic acid, and heating the treated material to cure the said polymerization product. 2,499,653. American Cyanamid Co.

Aqueous alkali-metal alginate spinning solution which also contains, as a viscosity-reducing agent, a salt selected from the group consisting of sodium hyposulphite, potassium hyposulphite and ammonium hyposulphite. 2,499,697. Courtaulds Ltd.

In production of regenerated cellulose products the step comprising subjecting the freshly regenerated cellulose to a solution of a salt of the group consisting of polyphosphates, metaphosphates and pyrophosphates. 2,501,090. Oscar Kohorn & Co. Ltd.

Treating pile fabrics having a pile of animal fibers by applying an aqueous formaldehyde solution and then contacting the dampened pile with an iron heated to at least 350° F. and applying an aqueous solution of a curable thermosetting aminoplast resin and then heating. 2,501,435. American Cyanamid Co.

Water, Sewage, etc.

Aluminum hexacarbamide periodide as water disinfectant. 2,498,174. U.S.A. as represented by the Secretary of War.

*Agricultural**

Soil fumigant comprising 1,3-dichloropropene and 1,2-dichloropropane. 2,502,244. Walter Carter, dedicated to the People of the U.S.A.

Treating crude benzene hexachloride, which is the total mixture of normally solid isomers obtained by the additive chlorination of benzene, to produce a benzene hexachloride composition having an enhanced proportion of gamma-isomer to the alpha-isomer, by extracting the crude benzene hexachloride in the cold with at least one normally liquid solvent homologue of benzene selected from the group consisting of toluene, ortho-, meta-, and para-xylene, mesitylene, cumene, and pseudocumene. 2,502,258. Imperial Chemical Industries Ltd.

Toxicant for mealy bugs consisting of a mixture of isoparaffinic and paraffinic hydrocarbons obtained by alkylation of C_3 to C_5 isoparaffins with C_4 and C_5 olefins in the presence of a catalyst selected from the group consisting of sulfuruc acid and hydrofluoric acid. 2,502,366. Socony-Vacuum Oil Co., Inc.

Treating produce for agitating insects thereon preparatory to removal of the insects by washing comprising subjecting the produce to an aqueous mixture containing pyrethrins and simultaneously subjecting said produce to a vacuum and then releasing the vacuum while the produce is submerged in the pyrethrins mixture. 2,502,376. McLaughlin Gormley King Co.

Alkyl mono-nitrophenyl thionobenzene-phosphonates insecticidal compositions. 2,503,390. E. I. du Pont de Nemours & Co.

Purifying and stabilizing crude acid-containing DDT produced by condensation of chloral with monochlorobenzene in the presence of sulfuric acid by contacting the crude molten DDT with a compound of the group consisting of calcium oxide, barium oxide, magnesium oxide and lead oxide. 2,503,452. Allied Chemical & Dye Corp.

Aminophenols as stabilizers for diphenyl polyhaloethane emulsions. 2,503,915. Rohm & Haas Co.

Smear for screwworm control comprising an emulsion containing an aqueous continuous phase and a solution of diphenylamine in benzene as the dispersed phase. 2,504,207. E. I. du Pont de Nemours & Co.

Miticidal compositions comprising a 2,2-bis (para-alkoxyphenyl)-propane. 2,504,382. E. I. du Pont de Nemours & Co.

Manganous ethylene bis-dithiocarbamate and fungicidal compositions containing same. 2,504,404. E. I. du Pont de Nemours & Co.

Insect combative composition comprising an N-substituted alkenyloxyacetamide. 2,504,427. Lowell B. Kilgore.

Insecticidal composition characterized by both knock-down and killing power and containing, as an active insecticidal component, primary polyhalophenylethylamine in which the amino group and the polyhalophenyl group are attached to the ethyl group. 2,504,803. Mathieson Chemical Corp.

*Cellulose**

Bleaching a cellulosic material by suspending the material in an aqueous alkaline liquor, charging chlorine dioxide until the material is partially bleached. 2,502,410. Mathieson Chemical Corp.

Plastic composition comprising a member of the group consisting of cellulose esters and ethers and, as a plasticizer therefor, an unsubstituted α-alkylene succinimide. 2,502,962. Allied Chemical & Dye Corp.

Producing micro-porous material for separating the plates of a lead-sulphuric acid electric battery, by forming a coherent material from a composition comprising a mixed ester of cellulose containing the radicals of acetic acid and of a fatty acid containing at least 10 carbon atoms, with said ester of starch, and extracting the starch from the coherent material by dilute sulphuric acid. 2,504,208. Celanese Corp. of America.

*Ceramics**

Cementitious binder material consisting of reacting a water slurry of hydrated alkaline earth oxide, and an alkali metal aluminate. 2,502,418. Armstrong Cork Co.

*Coatings**

A wrinkle drying coating composition consisting of a conjugated double bonded oil and synthetic rubber latex. 23,212. New Wrinkle, Inc.

Coating composition consisting of pure soybean protein, sodium fluoride, anhydrous sodium borate, calcium hydroxide, deodorant and anti-foam agent, and mineral fillers and pigments. 2,501,827. National Gypsum Co.

Producing new drying compositions by reacting phenol oil and complex resinous epoxides. 2,502,145. Devoe & Raynolds Co., Inc.

Phosphating composition comprising an acid salt of phosphoric acid and a water soluble compound selected from the group consisting of molybdic acid compounds and tungstic acid compounds and a phenol. 2,502,441. Oakite Products, Inc.

New composition for use as a mold wash or mold dressing in casting ferrous metal shapes composed of an oil and water emulsion composed of still residue obtained from the live steam distillation of the sulphuric acid treated light oil fraction of coke gas, the still residue containing material not volatile at a temperature of about 212° to 214° F., finely divided carbon and a glycol. 2,502,473. Dacar Chemical Products Co.

Aqueous solution for treatment of metals selected from the group consisting of zinc and cadmium to preserve the luster and reduce oxidation consisting of chromium trioxide and hydrochloric acid. 2,502,476. Rheem Mfg. Co.

A wrinkle drying coating composition consisting of a wrinkling oil and dextran ether. 2,503,622. New Wrinkle, Inc.

*From Vol. 632, No. 4; Vol. 633, Nos. 1, 2, 3.

A wrinkle drying coating composition consisting of a wrinkling oil and a mixture of dextran ethers. 2,503,623. New Wrinkle, Inc.

A wrinkle drying coating composition consisting of a wrinkling oil and dextran acetate. 2,503,624. New Wrinkle, Inc.

*Detergents**

Detergent composition for household cleaning which comprises a mixture of inorganic, alkaline detergent salts soap and a pH indicator having the property of changing color due to pH within said range of 8.3 to 10.5. 2,502,881. Elizabeth Weston Parker.

Detergent composition consisting of trisodium phosphate, soda ash, sodium sesquicarbonate, sodium borate, sodium bicarbonate, an alkali salt of citric acid, potassium tartrate and sodium tartrate. 2,503,381. Arrow Laboratories, Inc.

*Dyes & Pigments**

Preparing magnesium ferrite pigments by heating an iron oxide and a magnesium compound of the class consisting of the oxides and carbonates in the presence of a catalyst consisting of a halide salt. 2,502,130. Columbian Carbon Co.

Manufacture of highly dispersed brown monoazo pigments useful in the mass pigmentation of viscose by coupling a diazotised monoarylamine with a coupling component selected from the group consisting of acetoacetarylamides and 2:3-hydroxy-naphthoic arylamides in the presence of gas black. 2,502,254. Imperial Chemical Industries Ltd.

Removing excess of azo dye component from regenerated cellulosic articles that have been printed in the gel state by coupling azo dye-forming components by depositing a film of hydrated aluminum hydroxide while still in the gel state. 2,502,911. Edward L. Wolfram.

Developing color on a textile material from a printing paste containing the leuco sulfuric acid ester of 3,4,8,9-dibenzpyrene-5,10-quinone by steaming in the presence of a hydroxylammonium salt. 2,503,300. General Aniline & Film Corp.

In preparing titanium dioxide, the step which comprises hydrolyzing an aqueous solution of a titanium sulfate solution in the presence of a small amount of an alkali metal titanate. 2,503,692. American Cyanamid Co.

Polymethine dyes containing a triazole nucleus. 2,503,709. Eastman Kodak Co.

Pyrrolocyanine dyes containing a carboxyalkyl or sulfoalkyl group. 2,503,775. Eastman Kodak Co.

Cyanine dyes containing a sulfo-hydrocarbon radical. 2,503,776. Eastman Kodak Co.

Preparing vat dyestuffs of the dibenzanthrone and isodibenzanthrone series. 2,503,823. Ciba Ltd.

Acid dyestuffs of the anthraquinone series. 2,503,855. Sandoz Ltd.

Producing cadmium red pigments by preparing a crude cadmium red greencake; washing; adding a water soluble salt of a strong base and an oxygenated sulfur acid; and calcining. 2,504,147. Glidden Co.

Sulfur and chlorine containing dyestuffs obtained by reacting with an aluminum-chloride-sulfur-monochloride complex addition compound upon a water-insoluble compound of the triphen-dioxazine series, said dyestuffs being characterized by dyeing cotton from a sodium sulfide vat in violet to red shades. 2,504,153. E. I. du Pont de Nemours & Co.

Preparing trinuclear cyanine dyes by treating a thiazolone with a cyclammonium quaternary salt. 2,504,468. General Aniline & Film Corp.

p-dialkylaminostyryl dyes containing a new group attached to the nitrogen atom of the heterocyclic nitrogen nucleus. 2,504,617. General Aniline & Film Corp.

*Inorganic**

Recovering aluminum chloride from an anhydrous mixture with ferric chloride by contact with titanium tetrachloride, separating the undissolved ferric chloride from the resulting solution of aluminum chloride in titanium tetrachloride, and thereafter recovering aluminum chloride from said solution by cooling. 2,502,327. E. I. du Pont de Nemours & Co.

Use of fluoboric acid as a means of removing core sands from castings. 2,502,337. Pure Oil Co.

Production of titanium dioxide by oxidizing a vaporous titanium halide, in the presence of an added oxide of nitrogen. 2,502,347. E. I. du Pont de Nemours & Co.

Producing a catalyst of increased heat stability which comprises impregnating aluminum trihydrate of low sodium content with a soluble compound of molybdenum. 2,502,930. Standard Oil Development Co.

Granules of ammonium nitrate coated with a urea-formaldehyde resin. 2,502,996. Allied Chemical & Dye Corp.

Making an aluminum oxide gel comprising mixing aluminum sulfide with water slightly acidulated with a volatile organic acid. 2,503,168. Davison Chemical Corp.

In removal of hydrogen sulfide from gases by passing through at least three washing zones with a single aqueous carbonated alkaline suspension of an iron compound selected from a class consisting of hydrated iron oxide, iron carbonate and basic carbonate of iron; revivifying the mixed spent liquor by subjecting it to the oxidizing action of air and passing the revivified liquor back to said common source. 2,503,528. R. Walker, C. R. Wilkin, H. G. Cooper and J. T. Brown.

Drying inorganic hydrogel particles by mixing with normal butanol containing sorbitan mono-oleate, distilling the water from said hydrogel as an azeotrope and then removing the butanol. 2,503,913. Standard Oil Development Co.

Preparation of a heteropolyacid by preparing an aqueous solution containing dissolved therein two alkali metal compounds of which one is selected from the group consisting of an alkali metal silicate and an alkali metal phosphate, the second being an alkali metal molybdate when the first is an alkali metal silicate, and the second selected from the group consisting of an alkali metal molybdate and an alkali metal tungstate when the first of said compounds is an alkali metal phosphate, contacting an active cation-exchange reagent with said aqueous solution, and separating an aqueous solution containing a heteropolyacid from the group consisting of silico-molybdic acid, phospho-tungstic acid, and phospho-molybdic acid. 2,501,991. E. I. du Pont de Nemours & Co.

Preparation of silica-vanadia catalyst. 2,504,001. Standard Oil Development Co.

Producing oxygen by liquefaction of air in which a portion of the air is expanded to supply refrigeration without loss of oxygen content of the air. 2,504,051. Hydrocarbon Research, Inc.

In producing anhydrous sodium sulfate, the steps consisting in discharging a continuous stream of a saturated solution of sodium sulfate downwardly as a thin tubular liquid film from the upper end of a combustion zone to the lower end thereof and spraying additional saturated solution of sodium sulfate into the free space of said zone to evaporate water from said solution. 2,504,097. West End Chemical Co.

Forming a permanganate by reacting a solution of aluminum permanganate with a member of the class consisting of zinc and magnesium oxides, hydroxides and carbonates. 2,504,129. Carus Chemical Co.

Forming an alkaline earth metal permanganate, by reacting a solution of aluminum permanganate with a member of the class consisting of an oxide, hydroxide and carbonate of an alkaline earth metal. 2,504,130. Carus Chemical Co.

Forming a permanganate of the class consisting of alkali metal and ammonium permanganates, by reacting a solution of aluminum permanganate with a member of the class consisting of an oxide, hydroxide and carbonate of an alkali metal, ammonium hydroxide and ammonium carbonate. 2,504,131. Carus Chemical Co.

Manipulating an iron-containing diatomaceous earth to improve its properties by mixing with earth carbon and a basic compound of an alkaline-earth metal: heating: treating with gaseous chlorine and converting said iron to a volatile chloride; removing said volatile chloride, and treating the hot residual earth with an oxygen-containing gas, liberating the chlorine and producing a substantially water-insoluble alkaline-earth metal compound combined with the thus treated diatomaceous earth. 2,504,357. Great Lakes Carbon Corp.

Removing fluorine from acidic solutions containing nitrate and phosphate ions, obtained by dissolving raw phosphate material in nitric acid, by steam distilling the fluorine from the solutions in the form of a material selected from the group consisting of HF and SiF_4. 2,504,446. De Directie van de Staatsmijen in Limburg.

Manufacture of concentrated phosphoric acid having a low fluorine content comprising mixing finely divided phosphate rock with 98% sulphuric acid to react with all sulphuric acid reactible compounds and form phosphoric acid from the calcium phosphate, heating to form a clinker, said mixing and heating steps volatilizing about 90% of the fluorine in the phosphate rock to form a clinker substantially free of fluorine, and leaching the clinker with water to form phosphoric acid. 2,504,544. Davison Chemical Corp.

Manufacturing a mixed phosphatic fertilizer having a low fluorine content in a condition for bagging and use, comprising mixing finely divided phosphate rock with sulfuric acid, said phosphate rock and sulfuric acid being mixed to react with the acid reactible constituents in the rock and form phosphoric acid from the calcium phosphate to form a clinker, grinding the clinker and ammoniating and adding water to form a mixed fertilizer. 2,504,545. Davison Chemical Corp.

Manufacture of a superphosphate fertilizer having a low fluorine concentration from phosphate rock comprising mixing finely divided phosphate rock with about 98% sulphuric acid in which sulphuric acid reacts with the acid reactible compounds in the rock and with the calcium phosphate in the rock to form mono-calcium phosphate, heating, said mixing and heating steps volatilizing about 60% to 75% of the fluorine originally present in the phosphate rock, grinding, adding water to complete the reaction between the sulphuric acid and phosphate rock to effect conversion of the phosphate to the citrate soluble form, and graining. 2,504,546. Davison Chemical Corp.

Producing beryllium oxide by reacting ammonium sulfate with ammonium beryllium fluoride by heating with the resulting production of beryllium sulfate and evolution of ammonium fluoride, and then heating the beryllium sulfate to form high-purity BeO. 2,504,696. Beryllium Corp.

Preparing an alkali metal hydride comprising reacting hydrogen with a mixture of a relatively small amount of an alkali metal and a relatively large amount of a finely divided solid material in the presence of a modicum of a reaction product of an alkali metal and an acetylenic compound. 2,504,927. E. I. du Pont de Nemours & Co.

*Metals**

Solution for plating metals with gold, comprising gold chloride, tribasic sodium phosphate, potassium cyanide, acetic acid, and distilled water. 2,501,737. Ralph W. Porter, Jr. and Clifford M. Jones.

Alkaline roasting of an acidic oxide ore. 2,501,952. Bennett Preble.

Finely divided porous nickel hydrogenation catalysts consisting of a nickel-chromium alloy in porous, activated form. 2,502,348. Societe des Usines Chimiques Rhone-Poulenc.

Recovering silver from dilute solutions by incorporating a precipitant produced by subjecting cellulosic substances containing hemicellulose and lignin to the action of a dilute mineral acid. 2,503,104. Timber Engineering Co.

Making electrolytic iron, by subjecting an electrolyte containing ferrous and ferric chlorides to electrolysis, withdrawing a portion of the anolyte, leaching an ore characterized by containing iron sulphide in pyrrhotitic form to dissolve the iron of the iron sulphide as ferrous chloride and to reduce the ferric chloride of the solution to ferrous chloride, then heating to the boiling point to remove any copper, separating the resulting reduced solution from residual solids and undissolved iron sulphide, and delivering the same into the catholyte. 2,503,234. Sulphide Ore Process Co., Inc.

Electrodeposition of iron. 2,503,235. Sulphide Ore Process Co., Inc.

Removing impurities from zinc electrolyte solutions by adding small amounts of zinc dust, copper sulphate, a soluble compound of antimony and lead. 2,503,479. Hudson Bay Mining and Smelting Co. Ltd.

Manufacture of chromium by electrolyzing an aqueous solution of a water soluble sodium chromate. 2,504,095. Pacific Bridge Co.

Electrodeposition of silver from an aqueous solution consisting of silver pyrophosphate. 2,504,272. Ewald H. McCoy.

In forming an oxide coating on aluminum by treating in an aqueous carbonate type solution containing alkali metal carbonate, the improvement comprising providing in the solution a soluble salt of aluminum. 2,504,434. Aluminum Co. of America.

*Organic**

In producing acrylonitrile by heating ethylene cyanohydrin in the presence of a residue resulting from the heat treatment of the ethylene cyanohydrin to cause dehydration of the ethylene cyanohydrin, the improvement which consists in carrying out the dehydration in the presence of a catalytic mixture comprising sodium chloride and carbon monoxide. 2,501,651. American Cyanamid Co.

Dicyclopentadiene dithiocyanate. 2,501,697. Koppers Co., Inc.

Manufacture of butyraldehyde by the catalytic hydrogenation of crotonaldehyde in the presence of nickel. 2,501,708. Distillers Co., Ltd.

Synthesis of disulfides. 2,501,792. Phillips Petroleum Co.

Recovering stearic acid from sludge containing stearic acid, aluminum stearate, aluminum particles and impurities by adding hydrochloric acid and thereby converting metal soaps to free fatty acids and converting the aluminum particles to aluminum salts, bringing said salts into solution by the addition of water, separating a stearic acid-oily solid which separates from the said salt solution. 2,501,806. Joshua Robert Akers and Carl B. Hamlin.

*From Vol. 632, No. 4; Vol. 633, Nos. 1, 2, 3.

Chemical Industries MARKET PLACE

CLASSIFIED ADVERTISING

LOCAL STOCKS • CHEMICALS • EQUIPMENT • RAW MATERIALS • SPECIALTIES • EMPLOYMENT

RATES IN THIS SECTION: Displayed: $7.00 per inch. Contract rates on request. Undisplayed: "Position Wanted" and "Help Wanted" ads: 5c per word. Box number counts as 10 words. Minimum charge: $1.00

NEW ADVERTISEMENTS must be received before the 17th of the month preceding date of issue in which publication is desired. Address Chemical Industries Classified, 522 Fifth Ave., New York 18, N. Y.

ILLINOIS

5000 STEEL TANKS

Brand NEW! Clean—Perfect Condition

Government Surplus

Stainless Steel—Size 12 x 24 inch, Type G I—18 gauge (.051") rated 400 P.S.I.—¼ inch I.P.T. at each end. All tanks are plugged at each end from date of manufacture. Wt. 18 lbs. Special Price, any quantity $8.50 each.

4000 STEEL TANKS

6 x 24 inch, Type D 2. Rated 400 P.S.I. ¼ inch I.P.T. at each end. Shipping wt. 6 lbs. Price each, any quantity $3.75.

Terms: Net 10 days, F.O.B. Chicago to approved, rated concern. Otherwise, send check with order.

WELLWORTH TRADING CO.
1831 S. State St., Dept. CI—Chicago 16, Ill.

Chemically Pure
METHYL METHACRYLATE
(Acrylic)

CH C(CH) — COOH
Monomeric-Liquid
Polymeric Powder
Dental Acrylic

PETERS CHEMICAL MFG. CO.
3623 Lake Street MELROSE PARK, ILL.
Telephone—Melrose Park 643

MASSACHUSETTS

DOE & INGALLS, INC.

Chemicals and Solvents

Full List of Our Products: see Chemical Guide-Book
Everett Station, Boston EVErett 4610

FOR ULTRAVIOLET ABSORPTION

Furfuralaxine
Cinnamalaxine
send for description

PILOT CHEMICALS, INC.
47 Felton Street, Waltham 54, Mass.

ALAN A. CLAFLIN
Manufacturers' Agent
DYESTUFFS and CHEMICALS
Specializing in
BENTONITE
and
TALC
88 Broad Street Boston 10, Mass.
TELEPHONE Liberty 5944-5945

GEORGE **MANN** & CO., INC.

Industrial Chemicals

GEORGE MANN & CO., INC.
Fox Point Blvd., Providence 3, R. I.
Phone GAspee 8466 • Teletype Prov. 75
Branch Office and Plant
Stoneham 80, Mass. • Phone WIlchester 2910

NEW JERSEY

FOR PROMPT SERVICE IN THE NEW YORK AREA

SOLVENTS—ALCOHOLS
EXTENDERS

CHEMICAL SOLVENTS
Incorporated
60 PARK PLACE NEWARK 2, N. J.
WOrth 2-7763 • MArket 2-3650

PENNSYLVANIA

SAUEREISEN
ACID PROOF CEMENTS

Let us help you with your acid-proofing problems
Send sketches and blueprints
Sauereisen Cements Co. Pittsburgh 15, Pa.

RHODE ISLAND

J. U. STARKWEATHER CO.
INCORPORATED
241 Allens Avenue
Providence, R. I.
INDUSTRIAL CHEMICALS
TEXTILE SPECIALTIES

Machinery and Equipment For Sale

FMC CUTS PRICES on DRYERS

Procter & Schwartz 3 Pass Dryer with S.S. Belt; 7'8" wide x 14'6" Ht. x 20' long, complete.
Procter & Schwartz Single Pass Dryer; 9 sections; 11' wide x 64' long.
Buffalo Single Drum Chrome Plated Vac. Dryer, 5'x12', complete with Vac. Pump, receivers and accessories.
Buflovak TWIN Drum Dryer; chrome plated 32" x 52".
3 Link Belt Multi Louvre Dryers; Nos. 310, 610, 1003.
4 Louisville Steam Tube Dryers; 6' x 25' and 6' x 50'.

FIRST MACHINERY CORP.
157 Hudson Street,
New York 13, N. Y.

---

300 Cylinders — CO_2 — 50 Pound Capacity, Retested — Excellent Shape. DYE OXYGEN COMPANY, Manufacturers, Phoenix, Arizona.

ALLIED STEEL & EQUIPMENT CO.
Dept. M, Chester, New Jersey
Liquid, Paste & Powder
MIXERS
• Stock Design
• Fabricated to Order

When you Buy Used Machinery

BE SURE and Buy from a Reputable Dealer

3—36" x 36" Shriver Rubber Filter Presses, semi-hard 1½" rubber plates, rubber covered 3" cast iron frames; 4-eye, corner feed, closed delivery, washing type. Each 18 chambers. Each with 50-ton Seco closing device.

Baker Perkins Heavy Duty Disperson Mixer—stainless steel, 100 gal. working capacity hydraulic tilt, suitable for vacuum, with drive and 60 HP motor, complete.

10—No. 71 J. H. Day Co. "Roball" Sifters, single deck, screening surface 40" x 84", with STAINLESS STEEL SIEVE FRAMES, SCREENS, FEED AND DISCHARGE HOPPERS, etc., each with 2 H.P. Motor and steel stand. Used 3 times only.

2—#12 Sweetland Filters 36 leaves on 4", also 72 on 2".

2—5'4" x 40' Ruggles Cales STAINLESS STEEL ROTARY DRYERS, for direct heat or low temperature hot air. Also one Nickel Dryer.

ONLY A PARTIAL LISTING

WE BUY AND SELL FROM SINGLE ITEMS TO COMPLETE PLANTS

THE KEY TO SAVING TIME AND MONEY

INSOLUTION PRODUCTS COMPANY, INC.

14-18 Park Row, New York 7, N.Y.

Barclay 7-0600

BE SURE — A reputable dealer wants to serve you always and will often sell you for less than what you would pay an Auctioneer or a private seller, off the floor of a plant.

Furthermore his quotation to you usually includes dismantling and loading on car or truck, so that his price is your cost, and you pay no extras.

Furthermore you buy from a reputable dealer with the assurance that whatever representations he makes will be lived up to, because he wants your business again. "Caveat Emptor" (let the buyer beware) is as obsolete as last week's newspaper, so far as our customers are concerned. So, when you want good Used Machinery, see us and BE SURE.

SPECIAL

SPERRY FILTER PRESS, 30 x 30, RGC Type 21, REC. plates, closed del. ¾" cake 42 plates.

SPERRY FILTER PRESS, 36 x 36, Type 613, Hydr. close, closed del. 53 plates, 53 frames, 1".

MIKRO PULVERIZERS, Model #2 SI, with feed screw hopper.

RAYMOND PULVERIZER, Type 0000, ser. 30055, with 10 Hp motor.

Aaron Equipment Company

1347 S. Ashland Ave. Chicago 8, Illinois

CHesapeake 3-5300

BUY "M. E. C."

For Satisfaction

STAINLESS STEEL UNITS

1—Pfaudler 100 gal. Reactor—Type 347 Stainless Steel.
3—Tanks—Closed 3450 gals. Type 347 Stainless Steel.
2—Towers 33" x 17'—Type 347 Stainless Steel.
4—Bubble Cap Columns 6" x 30'.
7—Coils 6', 7' and 8' diameters 2" pipe.
2—Day Ro-Ball Sifters 40" x 84".
1—AT&M Co. 26" Sus. Style Centrifugal, solid basket, DMD—2-speed.

Kettles, Tanks, Vac. Pans, etc.
Send for Bulletin A-25 for Complete listings.

The Machinery & Equipment Corp.
533 West Broadway, New York 12, N. Y.
GRamercy 5-6680

ANSWERS—

TO YOUR MACHINERY PROBLEMS

Artisan 1000 gal. S.S. jack. & agit. vacuum still.
S.S. 1300 & 2500 gal. jack. & agit. kettles.
Tolhurst, Fletcher 20" & 30" stainless steel centrifuges.
Devine 17 shelf vacuum shelf dryer.
Pfaudler 200 & 1250 gal. jack. & agit. Glass Lined kettles.
Louisville 4'6" x 25' & 6' x 30' tubular dryers.
NEW Eimco 4' x 1' steel vacuum filter.
UNUSED—24"—30"—36" steel C.D. washing type filter presses.
Oliver 8' x 8' acid construction filters.
NEW Buffalovak calandria type evaporator, 12' dia.

•

THESE . . . AND MANY MORE IDEAL UNITS NOW AVAILABLE IN OUR NEW YORK WAREHOUSE FOR IMMEDIATE DELIVERY.

CHEMICAL MACHINERY PROCESS CORPORATION

146 GRAND ST., NEW YORK 13, N. Y.

FOR SALE
STAINLESS STEEL EQUIPMENT

4—Bubble Cap Columns, type 347, 6' dia. x 30' high, 20 plates, 38-6" dia. caps per plate, stainless coils each plate
2—Sharples #16V Vaportite Super Centrifuges, dual purpose bowl, type 304 contact parts
3—3400 gal. Tanks, type 347, 9' dia. x 7'3" deep, flat bottom, flat bolted top, 2" pipe coils
3—1000 gal. non-jacketed kettles, type 347, heavy duty agitator, 25 HP 4-speed motor, 8' dia. x 3' deep
2—Spencer Gas Boosters or Compressors, type 347 600 CFM @ 80 oz. pr. 30 HP motor.

PERRY EQUIPMENT CORP.
1521 W. Thompson St., Phila. 21, Penna.

BUY BRILL

10—AT&M and Tolhurst Suspended & Centersiung motor driven Centrifugals, stainless steel, rubber & monel, 26", 30", 40" & 48".
5—2-Truck Atmospheric Steam Heated Dryers, 500 sq. ft. drying surface.
1—Oliver 3'x2' Rotary Vacuum Filter, wood drum, stainless steel filter.
10—Patterson, Abbe porcelain-lined Pebble Mills, 6'x5', 5'x4', 3'x4', 2'x3'.
6—Shriver, Sperry, cast iron P&F Filter Presses, 36", 32", 24", 12".
1—Swenson 4'x5' Rotary Vacuum Filter.
3—Sweetland Filters #7 and #2, Stainless Steel.
1—2'x15' Jacketed Crystallizer.
5—Louisville Tubular Dryers 6'x25', 6'x50'.
1—Bird 18"x28" monel Continuous Centrifuge.

Send for complete stock list.

BRILL EQUIPMENT COMPANY
2401 Third Ave., N. Y. 51, N. Y.
Telephone: Cypress 2-5703

WE CAN FURNISH YOU AT ANY POINT NEW AND USED STEEL DRUMS, NEW GALVANIZED DRUMS, RECONDITIONED DRUMS, AND NEW AND USED SLACK BARRELS AND FIBRE BARRELS.

BUCKEYE COOPERAGE CO.
3800 Orange Avenue
Cleveland 15, Ohio

WANTED TO BUY

BUSINESS OPPORTUNITY

HELP WANTED

SITUATIONS WANTED

BIO-ORGANIC CHEMIST, Ph.D., age 28. Experienced in enzyme work, food and nutrition, protein purification, fine organic syntheses, radiotracer techniques. Management, industrial and teaching experience. Location immaterial. Phi Beta Kappa, Sigma Xi. Box 4224, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

Ethylene Oxide

(Continued from page 48)

tol. The Cellosolves, first used as odorless nitrocellulose solvents, are ethers of ethylene glycol, and the Carbitols are ethers of diethylene glycol. These products are liquids with good solvent power, and are thus used for dissolving oils, gums, and plastics. Advantage is also taken of the stability and viscosity characteristics of Carbitol in conjunction with castor oil in brake fluids. Esters of the Cellosolve and Carbitol products with fatty acids find application as surface-active agents and plasticizers.

A second use for ethylene oxide is in fumigants, where it is combined with carbon dioxide to eliminate the explosion hazard. The vapors of ethylene oxide are effective in controlling mold spores, as a bactericide, and as a toxic agent against insect eggs. It is estimated that consumption of ethylene oxide for these miscellaneous uses amounts to 11 million pounds annually.

PRICES

Since sales of ethylene oxide have become significant only in recent years, a complete price history is not available. Records indicate price quotations of 15¢ per pound in 1947, gradually rising to the present level of 16¼¢, although some contract sales have been made at prices slightly under these general quotations. Quantities available for outside sale have been limited until recently, so that the market in general has been firm. As a result of the sizable expansions in both ethylene glycol

Professional Directory

A GUIDE TO CHEMICAL, CHEMICAL ENGINEERING, MARKETING, AND LABORATORY SERVICES

MARVIN J. UDY
Consulting Engineer
Inorganic Chemistry, Electrochemistry, Electric Furnace Smelting, Process Metallurgy.
Ferro-Alloys, Calcium Carbide, Phosphorus
Telephone 2-6394
846 Portage Road Niagara Falls, N. Y.

ALBERT L. JACOBS
Registered Patent Attorney
Chemical Patents a Specialty
60 East 42nd St., New York 17, N. Y.
MUrray Hill 2-2970

SEIL, PUTT & RUSBY, INC.
Established 1921
Earl B. Putt—President and Director
Alfred S. Moss—Vice President
Stephen S. Voris, Ph.D.—Chief Chemist
Expert analyses of drugs, insecticides, foods and essential oils.
16 East 34th St., New York 16, N. Y.
Telephone Murray Hill 3-6368

COLBURN LABORATORIES, INC.
Research Chemists
- New Product Development
- Organic Synthesis and Research
- Non-routine Analytical Work

723 S. Federal St. Chicago 5, Ill.

EXPERIMENTAL PHYSICS RESEARCH
Photochemistry, Chemical Kinetics, Reaction Rate Studies, Vapor Pressure of Low Pressure Substances, Structure of Solids and Adsorption Studies.
THE ANDERSON PHYSICAL LABORATORY
CHAMPAIGN, ILLINOIS

JOHN B. CALKIN
Consultant to the Pulp and Paper and Chemical Process Industries
Technical and Marketing Consultations
Industrial Research Advisor
Laboratory & Pilot Plant Investigations
500 Fifth Avenue at 42nd Street
New York 18, N. Y.

ROBERT CALVERT
Patent Attorney
Specializing in Chemical Cases
155 East 44th St., New York 17, N. Y.
MUrray Hill 2-4980

Paul H. Scrutchfield, Ph.D.
Consulting Chemist
Specializing in synthetic resins for use in protective coatings, adhesives, paper, textiles, ion exchange and plastics.
1237 Church St. Hannibal, Mo.

CHEMICAL CONSULTATION, RESEARCH and DEVELOPMENT
• Sponsored Industrial Research • Product & Process Development • Chlorination Processes • Chemotherapeutics • Custom Organic Syntheses • Microanalyses
THE PANRAY CORP.
Research Division
340 Canal St., New York 13

CONSULTING
Rubber Technologist
Natural and Synthetic Rubber
R. R. OLIN LABORATORIES
Complete Rubber Testing Facilities
Established 1927
P. O. Box 372, Akron 9, Ohio
Telephone HE 3724, FR 8551

R. S. ARIES
AND ASSOCIATES
Chemical Engineers & Economists
Process Analysis • Surveys — Technical & Economic • Market Research • Product Development • Evaluations • Application Research.
400 Madison Ave. N. Y. 17, N. Y. ELdorado 5-1430

John W. McCutcheon
475 Fifth Avenue New York 17
MUrray Hill 3-3421
CONSULTING CHEMIST
Specializing in Oils, Fats, Soaps, Synthetic Detergents, and Glycerine. Laboratory: 267 E. 149rd St. New York 54. MElrose 5-4288.

We now offer the determination of
FLUORINE
in organic compounds as well as the other services usually required of specialists in organic microchemical analysis.
Clark Microanalytical Laboratory
104½ W. Main St. Urbana, Ill.

LANCASTER, ALLWINE & ROMMEL
Registered Patent Attorneys
Patent Practice before U.S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request.
Suite 484, 815-15th St., N.W. Washington 5, D. C.

J Paul Bishop and Associates
• Consulting Chemical Engineers and Food Technologists •
• Specialists in Design and Modernization of Food and Chemical Plants and Processes. •
105 N. Second Street
Champaign Illinois

THE GRAVELLE LABORATORY
Specializing in Industrial Microscopy & Photomicrographic Illustration
Established in 1918 by Philip O. Gravelle, F.R.P.S.
To show the physical appearance of materials under magnification.
An informative service used by Scientific & Technical groups in many industries, for Development, Control & Advertising.
114 Prospect St., South Orange, New Jersey
Phone: South Orange 2-2701

FOOD RESEARCH LABORATORIES, INC.
Founded 1922
Philip B. Hawk, Ph.D., President
Bernard L. Oser, Ph.D., Director
Research - Analyses - Consultation
Biological, Nutritional, Toxicological Studies for the Food, Drug and Allied Industries
48-14 33rd Street, Long Island City 1, N. Y.

EVANS
RESEARCH AND DEVELOPMENT CORPORATION
★
Send for Booklet "C"
Chemical Research
Processes • Products
Pilot Plant
Optical and Mechanical Sections
Inspect our unusual facilities
★
250 East 43rd Street
New York 17, N. Y.
MURRAY HILL 3-0071

MOLNAR LABORATORIES
Analytical and Consulting Chemists
Phenol Coefficient Tests
HORMONE ASSAYS
PENICILLIN ASSAYS
Investigation, Control and Development of Pharmaceutical Products
211 East 19th St., N. Y.
GRamercy 5-1030

FOSTER D. SNELL INC.
PRODUCT DEVELOPMENT AND EVALUATION.
Physical Testing — Bacteriology, Clinical Studies — Market Research. Surface Activity and Detergency
Write For Booklet No. 11
Chemists ⇒ ⇐ Engineers
29 W 15 St. New York 11, N.Y. WA 4-8800

and ethylene oxide recently completed or now under way, however, supply should be more than ample to meet demand. Several major factors in the field anticipate reductions in glycol price over a period of the next year or two, which may also be reflected to some extent in the quotations for ethylene oxide.

REFERENCES

1. Journal of Commerce (New York), Jan. 31, 1950
2. Chemical Industries, Mar. 1949, p. 371
3. Chemical Industries, Feb. 1950, p. 175
4. Chemical Industries, Oct. 1949, p. 489
5. Canadian Chemistry & Process Industries, Oct. 1949, p. 898
6. Chemical Industries, Apr. 1950, p. 494
7. Chemical Industries, Aug. 1948, p. 203
8. Chemical Industries, Feb. 1950, p. 170
9. Soap & Sanitary Chemicals, Apr. 1950, p. 37 (Zussman & Bernstein)
10. Chemical Industries, June 1947, p. 960 (Field)
11. Chemical Industries, May, 1950, p. 666
12. Chemical Industries, Aug. 1947, p. 207
13. Ind. Eng. Chem., June 1950, p. 1251

Trade Marks

(Continued from page 93)

ADTEX. Free flowing crystal for weighting and plasticizing textile, leather, and paper products. 573,719. Haas-Miller Corp.

(Symbol). Active chemical ingredients for use in the manufacture of insecticides. 573,771. Hercules Powder Co.

HERCULES. Active chemical ingredients for use in the manufacture of insecticides. 573,772. Hercules Powder Co.

LANACID. Degras, Neutral woolgrease, lanolin alcohols, absorption bases, cholesterol, lecithin, beeswax, and lanolic acids. 573,793. Robinson-Wagner Co., Inc.

LANAMIDE. Degras, neutral woolgrease, lanolin alcohols, absorption bases, cholesterol, lecithin, beeswax, and lanolic acids. 573,794. Robinson-Wagner Co., Inc.

LANAMINE. Degras, neutral woolgrease, lanolin alcohols, absorption bases, cholesterol, lecithin, beeswax, and lanolic acids. 573,795. Robinson-Wagner Co., Inc.

LANOCERIN. Degras, neutral woolgrease, lanolin alcohols, absorption bases, cholesterol, lecithin, beeswax, and lanolic acids. 573,796. Robinson-Wagner Co., Inc.

NEOTRESAMIDE. Antibacterial preparation. 573,979. Sharp & Dohme, Inc.

POLYBOR. Weed control preparation consisting of a mixture of borax, sodium pentaborate, and a minor percentage of inert ingredients. 574,046. Borax Consolidated Ltd.

WEBFOOT BRAND. Fertilizer. 574,179. Webfoot Fertilizer Co., Inc.

LEADCO. Paint for machinery, tanks, and oil field equipment in general. 574,209. Chemicals, Inc.

R.B.X. 1495. Roach and waterbug killer. 574,252. John Sexton & Co.

MICRO-PLOSUL. Insecticides and fungicides. 574,410. Central Chemical Corp.

R. & H. Synthetic chemical compounds for use in foam prevention; ion exchange, absorbing acids or bases, and/or color removal; manufacture of wetting agents and oil additives; solvents, stabilizers, and/or plasticizers. 574,736. Rohm & Haas Co.

GOLDEN WEED. Fertilizers. 575,020. F. S. Royster Guano Co.

FREON-112. Tetrachlorodifluoroethane, used as heat transfer media, solvents, and chemical intermediates, and as constituents of same. 575,060. Kinetic Chemicals, Inc.

FREON-115. Monochloropentafluoroethane, used as refrigerants, propellants, and fire extinguishing preparations. 575,061. Kinetic Chemicals, Inc.

FREON-218. Octafluoropropane as refrigerants, propellants, and fire extinguishing preparations. 575,062. Kinetic Chemicals, Inc.

PYRENONE. Insecticides. 575,104. U. S. Industrial Chemicals, Inc.

FLOWTILE. Ready-mixed enamel paints. 575,341. Everseal Mfg. Co., Inc.

IMPERVO. Liquid adhesives for adhering lables to bottles. 575,715. National Starch Products Inc.

TOLADRYL. Antihistamine agent. 575,783. Parke-Davis & Co.

GILSPAR. Varnish. 576,407. Gilman Paint and Varnish Co.

FLEURIN. Fertilizers. 579,912. Alphons Horning Aktiengeselschaft.

FARMRITE SUPERGREEN. Fertilizers. 583, 243. Central Chemical Corp.

ANOHIST. Preparation for symptomatic relief of colds and allergies. 587,231. Anahist Co., Inc.

***SPOTS-OFF.** Cleaning and spot remover sticks and powders. 494,377. Frederick M. Turnbull.

MECHA FINISH CORP. Abrasive, grinding, deburring, burnishing, polishing, and coloring compounds. 500,316. Mecha-Finish Corp.

frisko suds. Soaps for dishes, laundry, fine fabrics, and general household cleaning. 515,893. Hilltop Labs.

STA-SAME. Shampoo and tonic for the hair. 516,318. Jerry's Mfg. Co.

BB. Shampoo and hair dressing. 516,815. Hal Collins Co.

SCARAT. Liquid rodent and other animal repellents. 518,053. Sparhawk Co.

Sparx. Polishing liquid for furniture, woodwork, automobiles, and all lacquered and varnished surfaces. 519,273. Higley Chemical Co.

BLP COP-R-TOX. Wood preservative containing copper for prevention of decay, fungus, and termite damage. 522,673. Mobile Paint Mfg. Co. of Delaware, Inc.

RE-WHITE. Bleaching solution. 524,041. Re-White Chemical Co., Inc.

Stemrap. Satin adhesive ribbons for flowers. 524,043. Floral Foam Products-New York, Inc.

Gleam. Liquid shampoo. 535,960. Hennafoam Co.

CHEMISEAL. Wood preservative for the control of moisture, rot, and insects. 538,495. Chemiseal Co.

Lifeline. Gummed cloth and gummed sisal tape. 543,013. Mid-States Gummed Paper Co.

MOBO. Chemical rust preventative, shock absorber fluid, hydraulic brake fluid, and chemical motor sealing liquid. 546,331. John T. Stanley Co., Inc.

JESSENITE. Plastic material simulating tile. 546,775. Marvelite, Inc.

RUMIDOR. Solid chemical compound which emits a vapor in a humidor to moisten and flavor cigars, cigarettes, and pipe tobacco. 547,694. Bender Corp.

DEVEX "T". Insecticides. 548,890. Food Machinery and Chemical Corp.

TRIVEX "T". Insecticides. 548,891. Food Machinery and Chemical Corp.

CP-40. Chlorination derivatives of paraffin wax. 555,816. Hooker Electrochemical Co.

TEXTUR-MASTIK. Fibrated vinyl resin coatings, fibrated alkyd phenolic coatings, and fibrated asphalt coatings, for use as protective and decorative coatings on exterior and interior construction surfaces. 555,974. Vose Process Corp.

FLYCASTER. Dressing for water-proofing flylines and flies. 558,525. Silicote Corp.

MYVACENE-S. Silicone vacuum grease. 559,503. Eastman Kodak Co.

*The following are from Official Gazette, Vol. 632, No. 4, and Vol. 633, Nos. 1, 2, 3.

COLD PACK. Paper gummed tape. 560,039. Package Service Co., Inc.

WYANDOTTE. Cleaning, cleansing, and washing compositions for general and specialized use in industries, public services, institutions, farms, and homes. 560,150. Wyandotte Chemicals Corp.

ANTARANE. Surface active agents, emulsifying agents, wetting agents, and dispersing agents. 560,555. General Aniline & Film Corp.

ANTARATE. Surface active agents, emulsifying agents, wetting agents, and dispersing agents. 560,556. General Aniline & Film Corp.

ANTARON. Surface active agents, emulsifying agents, wetting agents, and dispersing agents. 560,557. General Aniline & Film Corp.

KILLSHINE. Product designed to remove shine from clothes made of any type fabric. 560,944. Vitatex Products Corp.

UVITEX. Optical bleaching agent. 560,986. Ciba, Ltd.

Winterbottoms WONDER SAC SILVER POLISH. Fabric bag containing a chemical in powder form for cleaning and polishing silver, or any other metal. 562,167. Geo. P. Winterbottom & Son.

ARROWHEAD. Hydrated lime and quicklime. 563,557. U. S. Lime Products Corp.

MONSANTO. Surface active compounds for general use in the industrial arts. 564,365. Monsanto Chemical Co.

Kelon. Polymerizable synthetic resin-forming materials for use in casting, molding, impregnating, and like purposes. 565,111. Guy J. Berghoff, George L. West and S. Silberman.

THE IMP. Chemical soot destroyers and preventatives. 565,702. Gourmet & Co., Ltd.

EZIDEL. Chemicals and preparations and compounds thereof used in photographic processes. 567,256. General Aniline & Film Corp.

Air-aid THE AIR CORRECTIVE. Chemicals for clearing air of odors and smoke. 567,447. Air Correctives, Inc.

(Symbol) Methanol, and mixtures of synthetically produced lower molecular weight alcohols, aldehydes, methyl acetone solvents, propane and butane; antifreeze preparations; automobile radiator treating compounds; cigar and cigarette lighter fuels; fluids for hydraulic shock absorbers and brake systems; insecticides and fungicides; and chemical rust removers and preventatives. 567,625. Cities Service Oil Co.

Q-SOAP. Soap for infants. 567,713. Q-Tips Inc.

CITIES SERVICE. Alcohols, aldehydes, methylacetone solvents, propane and butane; anti-freeze preparations; automobile radiator treating compounds; cigar and cigarette lighter fuels; fluids for hydraulic shock absorbers and brake systems; insecticides and fungicides; and chemical rust removers and preventatives. 567,854. Cities Service Oil Co.

ELECTROCARB. Silicon carbide and mixtures in crude or partly finished form for use as foundry addition agents, chemical reducing agents or for use in manufacture of abrasives and refractories. 568,599. Electro Refractories and Alloys Corp.

GILRONEX. Rust proofing compositions for temporarily preventing rusting of metal between processing steps. 568,612. Gilron Products Co.

BROADWAY. Shoe polishes, shoe dressings, and shoe cleaners. 568,736. George J. Kelly, Inc.

Young Quality. Cleaner for removing rust, corrosion, and scale deposits in engine water-cooling systems. 568,886. Young Radiator Co.

BUSCO. Insecticides. 568,905. Buffalo Scientific Co.

Kalabond. Rubber-to-metal adhesive, rubber-to-fabric latex dip and tie cement. 569,372. General Tire & Rubber Co.

FYROGAS. Liquified petroleum gas for use in domestic and commercial gas systems. 569,449. Fyrogas Co.

DETROLINE. Chemical compound to be added to cleansing solvents to improve the cleansing action of the solvents. 569,776. Price Detergent Co.

MAYVAT. Vat dyestuffs of the anthraquinone, indigo and thioindigo series. 569,874. Otto B. May, Inc.

NATIONAL CHEMICAL EXPOSITION

by the Chicago Section of the American Chemical Society

presents

1900 A HALF CENTURY OF CHEMICAL PROGRESS 1950

The foremost names in the chemical industry, manufacturers of both chemicals and equipment, will display their latest and best products for your inspection. They will be present to tell you about them and to answer your questions. Bring your problems and come looking for new ideas. There will be over 250 booths with the newest in

CHEMICALS
EQUIPMENT
PROCESSES
IDEAS

The Trail Blazers of Chemistry will show you how individuals have solved their research problems.

The Industrial Movie Program presents continuous showings of specially selected movies, most of them in color.

The ACS Fall meeting will occur during the same week, offering hundreds of technical papers.

The Historical Exhibit will portray the part played by chemistry and chemical engineering in the industrial development of the fifty years ending in 1950.

The Art Exhibit by chemists will be international in scope—and it may even prove that chemists are human!

CHICAGO COLISEUM **SEPTEMBER 5-9, 1950**

For available space, write or wire

JAMES J. DOHENY, Manager
National Chemical Exposition

86 East Randolph Street Chicago 1, Illinois

INDEX *of* ADVERTISERS

INDEX *of* ADVERTISERS

How Do These GENERAL CHEMICAL FLUORIDES Fit Into Your Operation?

SODIUM BIFLUORIDE

SODIUM FLUORIDE

RIMMED STEEL: Added in pouring billets to insure a smooth rolled sheet.

LAUNDRIES: As a "sour" to neutralize excesses of soap and other alkaline detergents; to remove iron stains.

WATER TREATMENT: For fluoridation of public water supplies.

GLASS: As an etching and frosting agent.

PEST CONTROL: For extermination of vermin.

LEATHER: For treating infected hides.

ADHESIVES & STARCHES: In manufacture of glues and liquid starches.

MAINTENANCE: In cleaning stone and brick building exteriors.

HEAT TREATING: Ingredient of salts.

STAINLESS STEEL: As a Hydrofluoric Acid substitute in pickling baths.

WOOD PRESERVATIVE: To prevent insect attack on structural and other materials.

BASIC CHEMICALS

FOR AMERICAN INDUSTRY

THE WIDE VERSATILITY of General Chemical Sodium Fluorides enables them to play important and varied roles: from the manufacture of rimmed steel, to the treatment of public water supplies . . . from pest extermination, to commercial laundry work. Their chemical and physical properties indicate they may offer advantages worth investigating for many other operations too.

FOR DETAILED information on the quality and characteristics of these products, or for expert Technical Service in determining their potentialities for *your* operations . . . contact the nearest General Chemical office listed below.

General Chemical Sodium Fluoride and Sodium Bifluoride are available in the following strengths and densities: Sodium Fluoride, white—light or dense, 90% and 95% NaF, also Nile Blue—light, 95% NaF; Sodium Bifluoride, powdered, 90% $NaHF_2$.

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo • Charlotte Chicago • Cleveland • Denver • Detroit • Houston • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Portland (Ore.) • Providence • San Francisco • Seattle • St. Louis Wenatchee and Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

a WITCO *metallic soap*

MAY BE THE ANSWER TO YOUR PROBLEMS

The versatility of Witco's heavy metal stearates, oleates, naphthenates and octoates is indicated by typical industry applications:

PROTECTIVE COATINGS—stearates for viscosity pick-up, pigment suspensions, flatting, waterproofing and sanding . . . driers for rapid top and through dry of all films requiring catalytically induced oxidation and polymerization reactions . . . processing aids for pigment wetting and grinding . . . mildewproofing.

PLASTICS—stabilizers for polyvinylchloride types of resins to prevent degradation caused by heat and light . . . internal lubricants in molding compositions to obtain good flow . . . minimization of roll adhesion during calendering and milling.

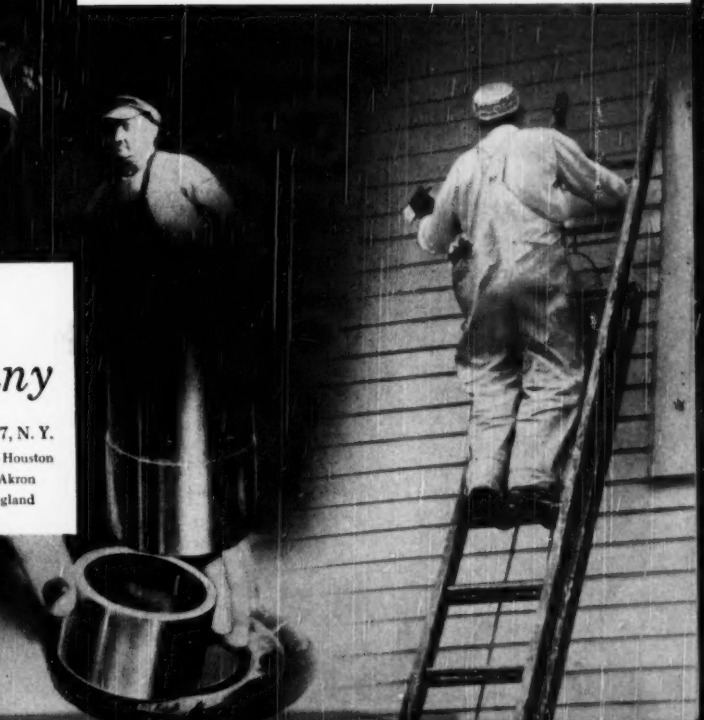
RUBBER—internal lubricants . . . mold release agents . . . dusting powders to destroy tackiness.

LUBRICANTS—extremely efficient gelling agents for manufacture of greases from mineral oils . . . in dry or solution form for wire drawing and metal stamping operations.

COSMETICS—adhesion, water repellancy, "slip" characteristics imparted to powders along with mild antiseptic action . . . desirable properties of stearic acid introduced in finely comminuted, stable and compatible form.

Let Witco's technical service staff work out the solution to your metallic soap problem with you. Write today.

YOU KNOW THAT WITCO MAKES HIGHEST QUALITY PRODUCTS



WITCO

Chemical Company

295 Madison Ave., N. Y. 17, N. Y.

Los Angeles • Boston • Chicago • Houston

Cleveland • San Francisco • Akron

London and Manchester, England